ASSESSMENT OF THE URBAN PUBLIC'S KNOWLEDGE OF WHITE-TAILED DEER MANAGEMENT IN TWO TEXAS COMMUNITIES

A Thesis

by

JESSICA LYNN ALDERSON

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

August 2008

Major Subject: Wildlife and Fisheries Sciences

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Approved by:

Chair of Committee,	Clark E. Adams
Committee Members,	John K. Thomas
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ABSTRACT

Assessment of the Urban Public's Knowledge of White-Tailed Deer Management in Two Texas Communities. (August 2008)

Jessica Lynn Alderson, B.S., Texas A&M University

Chair of Advisory Committee: Dr. Clark E. Adams

Urbanization throughout much of Texas has resulted in diminished wildlife habitat, resulting from fragmented landscapes. Several previous studies addressed the public's attitudes concerning the most acceptable white-tailed deer management techniques in urban areas. As a departure from these studies on urban residents' acceptance of alternative urban deer management strategies, this study assessed the types of information required by urban residents to more fully understand the best management practices for urban deer herds.

Two Texas communities, Lakeway and Hollywood Park, were chosen for this study. Since the 1990s, urban deer herds have negatively impacted these communities through increased deer-vehicle collisions, defined browse lines throughout the community, and human-deer encounters. The current number of households in each community was determined and used to calculate the household sample size in Lakeway (N= 4,090, n = 704) and Hollywood Park (N= 1,547, n = 616).

An Internet survey was developed which asked an adult resident of each selected household about his or her knowledge of factors that lead to population growth in urban white-tailed deer populations, personal encounters with an urban deer herd in the

community, the types of management options he or she would choose in dealing with the urban deer herd, and why and what types of information the respondent would most like to have regarding urban deer management. Finally, demographic information was asked such as age, gender, level of education and years of residency in the neighborhood.

The information derived from this study reveals the public's knowledge, attitudes, actions, and expectations concerning over-abundant white-tailed deer populations in Lakeway and Hollywood Park, Texas. This information can be used to assist communities such as Lakeway and Hollywood Park, as well as the Texas Parks and Wildlife Department, to develop appropriate educational materials that will provide relevant, current, and accurate information about urban deer population ecology and management for the urban resident. The methods of this study will serve as a useful tool for others to develop pro-active management strategies for controlling over-abundant urban white-tailed deer populations and aid in reducing the conflict between urban deer managers and the public.

DEDICATION

This thesis is dedicated to my parents, Kenneth and Corinne Drum, and to my husband, Chris.

ACKNOWLEDGEMENTS

First, I would like to give many thanks to my committee chair, mentor, and friend, Dr. Clark Adams for his guidance and support throughout this entire experience. I greatly appreciate his dedication to his students and passion for urban wildlife management. Dr. Adams, you have inspired me to pursue a career in urban wildlife management and I cannot thank you enough for that. I also thank my committee members, Dr. Billy Higginbotham and Dr. John Thomas, for their valuable input and advice.

Special thanks go to Charles Edwards and Will Mangum for their much appreciated cooperation over the course of this project. Thank you also to Robert Latham and James Bonds for providing me with the exciting experience of urban deer trapping. I would like to acknowledge the following Texas Parks and Wildlife staff for their valuable input during the survey development: Kevin Schwausch, Ryan McGillicuddy, Clayton Wolf, and Matt Wagner.

I extend my sincere gratitude to all of my wonderful friends, especially Sunni Stacey and Marian Higgins, for their unconditional moral support and patience. Last but not least, I thank my parents for their encouragement and my husband for his endless love and support. I am very grateful to have such loving and caring friends and family; I could not have done this without them.

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1. INTRODUCTION

Literature Review

White-tailed deer (*Odocoileus virginianus*) pose a growing urban wildlife management problem in many metropolitan areas throughout the United States. Urban deer can cause a substantial amount of economic loss to humans through property damage, personal damage in deer-vehicle collisions, and disease risks (McCullough, Jennings, Gates, Elliott, & DiDonato, 1997; Waller & Alverson, 1997). Typically, urban residents encounter deer between rural and urban lands or parks within their communities. These areas contain high human population densities interspersed with deer habitat, and are well suited to wildlife species that are habitat generalists (Adams, 1994). White-tailed deer populations can grow rapidly in some urban areas due to: the lack of natural predators, patchy and defined edge habitats that are ideal for breeding, highly controlled hunting, increased production and survival of offspring, abundant food resources, and tolerance of human activities (Adams, Lindsey, & Ash, 2006). Adams et al. (2006) examined factors that could better predict urban white-tailed deer population size than those traditionally used. They found that humans and deer have similar habitat preferences including open green spaces such as golf courses, large home lots, and parks. In general, urban landscapes serve as suitable habitat for white-tailed deer as well as humans.

This thesis follows the style of *Human Dimensions of Wildlife*.

Usually, when deer first appear in urban habitats, humans consider them to be beautiful, non-threatening, and a highly valuable wildlife resource (Warren, 1997). However, when deer "cross the line" beyond what is perceived as acceptable versus unacceptable behavior (Schmidt, 1997), conflicts may arise between deer and people. Residents then start to weigh their full range of options concerning urban deer management (VerCauteren, Lavelle, & Hygnstrom, 2006). Communities seldom want to completely eliminate the deer population, but any management technique can become a controversial issue (Kilpatrick & Walter, 1997; Stout, Knuth, & Cutris, 1997). For instance some people may want the deer to be removed or controlled using nonlethal methods, while others will support lethal management methods due to unpleasant encounters with overabundant urban deer herds (Decker & Gavin, 1987). Negative encounters, such as deer-vehicle collisions and human-deer encounters, receive the highest priority by stakeholders involved in the decision–making process concerning management options (Nielsen, Porter, & Underwood, 1997). For example, substantial increases in deer-vehicle accidents resulting in property damage, injury, or death will usually tip the balance in favor of more aggressive urban deer herd management plans.

Because of deer population growth in urban communities over the last 20 years, deer management has shifted from management of a game species to management of a nuisance animal (Green, Askins, & West, 1997). This shift has caused a management dilemma for state departments of natural resources. There are a variety of control measures when dealing with rural white-tailed deer, but many of these options cannot be used in urban settings. For example, hunting may not be legal within many city limits

and is not a practical management strategy in urban communities (Bishop, Glidden, Lowery, & Riehlman, 1999). Wildlife managers must consider community residents' safety before proceeding with any management option.

Problem Statement

As urban sprawl increases, natural habitat available to wildlife significantly decreases, but many species, e.g., white-tailed deer, are able to adapt to urban environments and related human lifestyles. When humans and wildlife live close to one another, an increase in human-wildlife conflicts occurs (Organ & Ellingwood, 2000). Most human reactions to wildlife are based on previous knowledge and experience with the species involved, and what the animal was doing when a person encountered it (Adams et al., 2006). People in urban communities usually enjoy seeing white-tailed deer browsing in urban parks and even in their own yards until the deer population becomes a nuisance by eating expensive plants, trees or gardens (Stout & Knuth, 1995). Previous studies have evaluated the public's interest, attitude, perception, and opinion about overabundant white-tailed deer populations, and acceptable management options (Curtis & Hauber, 1997; Chase, Schusler, & Decker, 2000; Fulton, Skerl, Shank, & Lime, 2004; Koval & Mertig, 2004). This study determined the degree to which urban residents' deer management preferences were grounded in an adequate knowledge base, an understanding and acceptance of available and appropriate management strategies, personal involvement in deer management, involvement in wildlife-related activities, and selected demographic characteristics. Unlike previous studies, this investigation centered on community as a determinant of differences in response on the issues listed

earlier. It seemed reasonable to expect that residents from two different communities, each with an overabundant deer herd, would also have similar attitudes, activities, expectations, and knowledge concerning deer management. If this proves to be the case, then a tailored set of educational materials could be developed that provide the baseline information on how to address urban deer management in urban communities.

Lindsey and Adams (2006) used reference tracing, electronic databases, and internet searches to review published literature on the transfer of wildlife information to the public. They found a high demand for wildlife information from the public and a need for effective information-transfer strategies by state and Federal wildlife management agencies. In 2004, Lauber and Knuth evaluated the effects of information on attitudes toward the use of contraception as a suburban deer management technique. All too often, many citizens are not adequately informed about the efficacy of using different management techniques on the deer herds in their community. Communication between the public and other stakeholder groups is a key factor in reducing conflict within the community. The primary goal of communication is to educate all stakeholder groups so they can make well informed choices about where they stand on an issue. It is important to inform the public about all aspects of the issue, not just information that will persuade them in a certain direction. Many citizens in Lauber and Knuth's (2004) study changed their attitudes about this management technique after being given relevant information on the appropriateness, effectiveness, and humaneness of contraception.

Objectives

The general goal of this study was to identify what a sample of urban residents' know about the ecology and management of urban white-tailed deer populations in order to develop educational materials that would help them become more informed citizens on the complexities of urban wildlife management. The specific objectives were:

1) Categorize the levels of public knowledge about overabundant urban white-tailed deer population ecology and management techniques.
2) Determine the type of educational materials needed to provide current and accurate information about urban deer management.
3) Provide a report to Texas Parks and Wildlife (TPWD) that provides baseline data on the urban public's educational needs, and prepare public briefing literature, in cooperation with TPWD, for distribution to stakeholder groups.
4) Distribute briefing literature among stakeholder groups, and facilitate public discussion of the findings of this study and its recommendations.
5) Develop and provide educational materials on urban white-tailed deer population ecology and management to the public.

Four hypotheses were tested to determine community differences, if any, among residents' responses to selected questions in the survey.

Hypotheses

Urban deer management options vary on a scale from no management to lethal actions. Anecdotal evidence suggests that citizens residing in the communities of Hollywood Park and Lakeway, TX have different perspectives in terms of their

activities, attitudes, expectations, and knowledge concerning urban deer management. For this study, community (Hollywood Park and Lakeway) is the independent variable. Significant differences ($P < 0.05$) among respondents for the following dependent variables were tested: their involvement in urban deer management, level of acceptance of various deer management options in their community, expected types of urban deer management outcomes, and knowledge about urban deer management. Specifically, the following four null hypotheses (H_o) were tested (Table 1):

$_1H_o$: There will be no community differences in citizen involvement in deer management.

Respondents were asked to identify various urban deer management activities they have personally conducted at their home or in the community. Additional questions determined how they became involved in the decision-making process regarding deer management in their community.

$_2H_o$: There will be no community differences in deer management preferences. First, respondents were asked whether they favor or oppose any efforts to reduce the size of the deer herd in their community. An additional question asked them to select from a series of eleven alternative urban deer management options using a 5-point Likert scale ranging from very unacceptable to very acceptable.

$_3H_o$: There will be no community differences in the types of deer management outcomes citizens expect.

Respondents were asked to identify what they consider to be evidence of a successful urban deer management program. They were also asked to identify the most salient

issues, from a list of ten, that need to be considered in an urban deer management program. Their selection was based on a 5-point Likert scale ranging from never to always.

$_4H_o$: There will be no community differences in citizens' knowledge about urban deer ecology and management.

Respondents were asked a series of sixteen questions about urban deer ecology and management. They were also asked to identify how deer management is being conducted in their community, and the degree to which the TPWD is involved.

Table 1
Null hypotheses and corresponding 2008 Internet survey questions

Hypothesis	Survey Questions
$_1H_o$: There will be no community differences in citizen involvement in deer management.	5 7 19
$_2H_o$: There will be no community differences in deer management preferences.	8 15
$_3H_o$: There will be no community differences in the types of deer management outcomes citizens expect.	11 14
$_4H_o$: There will be no community differences in citizens' knowledge about urban deer ecology and management.	9 10 18 20 21

Note. Refer to survey (Appendix A) for questions.

2. METHODS

Study Area

Two Texas communities were chosen for this study: Lakeway (LWY), located northwest of Austin, Texas and Hollywood Park (HWP), located in the north central area of San Antonio, Texas. Based on the United States Census Bureau's 2006 estimates, San Antonio is the 2nd largest city and Austin is the 4th largest city in Texas (U.S. Census Bureau, 2006). These two communities are located in central Texas and have similar geographic, ecologic, and socioeconomic characteristics. Situated in the hill country of Texas, Austin and San Antonio and their outlying subdivisions such as Hollywood Park and Lakeway, are areas of rapid deer population growth in urban communities. As such Lakeway and Hollywood Park were ideal choices for this study because of their high density deer populations.

Lakeway is bordered by Lake Travis and a golf course that serve as suitable habitat for urban white-tailed deer. San Antonio suburban development has annexed Hollywood Park, which was once a rural community. Residential homes in both communities are generally built on large lots ranging from 0.5 to 1 acre in size. There are also several larger lots existing within the Hollywood Park community. Commercial land sites within Hollywood Park remain open for future development.

Since the 1990s, urban deer herds have negatively impacted Lakeway and Hollywood Park through increased deer-vehicle collisions, defined browse lines throughout the community, and human-deer encounters. Each community has a Deer Control Committee that decides, in cooperation with TPWD, management strategies for

controlling the urban deer herds. Every year, Lakeway documents deer-vehicle collisions, human-deer encounters, number of deer found injured, or dead, and number of fence related accidents. The Deer Control Committee uses this information to decide if their current management plan is successful.

Lakeway and Hollywood Park have implemented a city ordinance which prohibits the feeding of deer, restricts public access to deer control areas, and assigns penalties for damage or destruction of deer control equipment. Violators are charged with a Class C misdemeanor punishable by a fine of $1 to $500. These urban white-tailed deer management strategies have created a conflict between residents and deer managers. For example, residents have cut down expensive drop nets, walked their dogs around the trapping sites, and continue to feed the deer even though it is prohibited. Their behavior could be due to a lack of definitive information as to what are the best management practices for controlling urban deer herds.

Currently deer managers in Lakeway, Texas use drop nets to trap white-tailed deer when it has been determined that herds have grown to more than 1,000. It is unknown how this number was determined and why it became the baseline to initiate the management program. The drop nets have a remote controlled, silent release system. This is important when trapping deer because they scare easily. Automatic feeders are used to bait the trapping sites. All trapping sessions are well documented and a police escort is always present. Trapping typically occurs from October through March. Once the deer are trapped, the deer managers expedite a thinning of the herd using one of two options known as Trap/Tranquilize, Transport, and Transplant (TTT) and Trap,

Transport, and Process (TTP). In order to use any of above urban deer control methods, the city must obtain a permit from the TPWD. If a rancher requests white-tailed deer for their lease-hunting operations, the deer may be transported to their location, but only after meeting the TPWD guidelines. For TTT methods, before deer are trapped or tranquilized, the TPWD must inspect the release sites for sustainable habitat; receive and approve a Wildlife Management Plan (WMP); and receive Site Information Forms for of every release location. A small percentage of transported deer are required by the state to be tested for Chronic Wasting Disease (CWD) before they are relocated. CWD is a transmissible neurological disease which produces small lesions on the brains of white-tailed deer, mule deer, and Rocky Mountain elk. The symptoms of this disease include loss of body condition, behavioral abnormalities and eventually death. It is not known exactly how the disease is spread, but it has been speculated that is may be passed in feces, urine or saliva. Human infection is a concern; however there have been no verified cases of CWD in humans (Williams & Miller, 2002). If deer cannot be relocated, the trapped animals are taken to the processing plant and the meat is donated to charitable organizations.

For the 2007-2008 trapping season, Lakeway removed a total of 95 white-tailed deer, 47 bucks and 48 does (Robert Latham, personal communication, April 28, 2008). Hollywood Park removed a total of 117 deer this trapping season. One-hundred and fourteen deer were relocated to ranches and 3 deer were sent to the processing plant and tested for Chronic Wasting Disease, as required by the state (Will Mangum, personal communication, June 8, 2008). Lakeway is currently using the TTP method and

Hollywood Park is practicing TTT (tranquilizing) method to control urban deer in their communities (Kevin Schwausch, personal communication, October 19, 2007).

Sampling

Respondent sample size was determined using the method suggested by Thompson (1992). The formula determined the minimum number of households required to achieve a confidence limit of $\pm$5% and $P < 0.05$. The sample size formula for this simple random sample of households was:

$$n = N\ p\ (1 - p) / [(N - 1)\ d^2 / z^2 + p\ (1 - p)],$$

where n = required sample size, N = total population size, p = population proportion, d = maximum allowable difference between the estimate and true value, z = tabular value for a particular probability based on a normal distribution. For this study, the value for d was 0.05 and the value for z was 1.96. The minimum sample size (n) required was doubled to offset potential non-response bias. The current number of households in each community was obtained by a private firm, AdMail, and used to calculate the household sample size in Lakeway (N= 4,090, n = 704) and Hollywood Park (N= 1,547, n = 616). AdMail provided a random list of household addresses for both communities.

This study began by conducting interviews with Kevin Schwausch, a TPWD Big Game Specialist; Charles Edwards, Deer Manager of Lakeway; Will Mangum, Deer Manager of Hollywood Park; and James Bonds, an urban deer trapper. These interviews were necessary to assess the current urban white-tailed deer population levels, management strategies, conflicts within the communities, and to develop the resident survey.

Survey Development

An Internet survey was designed using guidelines suggested by Schonlau, Fricker, and Elliott (2002) and Dillman (2007). Postcards were developed and mailed out asking selected households within each community to participate in the Internet survey. Each postcard contained a unique code which had to be entered in order to activate and participate in the survey. Every unique code entered was used to determine which households participated in the survey. The survey (Appendix A) consisted of several categories of questions including: an invitation and explanation; urban deer in your community; managing urban deer herds; urban deer: fact or fiction; recreational preferences; and selected demographics.

An adult resident (randomized by the most recent birthday) of the selected household was asked about his or her knowledge of factors that lead to population growth in urban white-tailed deer populations, personal encounters with the urban deer herd in their community, the types of management options he or she would choose in dealing with the urban deer herd, and what types of information he or she would most like to have regarding urban deer management. Finally, demographic information including age, gender, level of education and years of residency in the neighborhood was asked. At the end of the survey, respondents were given an opportunity to share any additional comments. Once the survey was submitted, the respondent was directed to the TPWD overabundant deer web site. Three weeks after the initial postcard (Appendix B) was sent out, a second postcard (Appendix C) was sent to the same households in Hollywood Park and Lakeway. The second postcard thanked residents that had

responded to the survey and requested that non-responding households take a few minutes to complete the survey. Participants from the households were given a total of six weeks to respond.

Non-Response Follow Up

After six weeks, the Internt survey was closed. In order to better understand why residents did not respond to the Internet survey, a third postcard (Appendix D) was mailed to a random sample of non-respondent households in Lakeway and Hollywood Park. AdMail provided a random list of household addresses for Lakeway and Hollywood Park for the initial postcards. Residents that responded to the Internet survey were removed from the list. Any postcards that were returned by the postal service, i.e. vacant household or not deliverable as addressed, were also removed from the list. From the remainder of households, a total of 572 households were randomly selected to receive the third postcard; 286 postcards were sent to Hollywood Park and 286 postcards were sent to Lakeway. Research methods, Internet survey and postcards were approved by the Texas A&M University's Institutional Review Board (Protocol Number 2008-0133).

Data Analysis

After data was collected from the survey, a SPSS database was be developed. Nominal level data was analyzed using the Chi square test. Likert scale responses were treated as interval level data and analyzed using analysis of variance (ANOVA). If there was a significant difference in the variance of a dependent variable's responses, a t-test was used to identify the mean differences between the two communities.

3. RESULTS AND DISCUSSION

Survey Response Rates

While evaluating survey responses, it was found that 11 Hollywood Park and four Lakeway participants had taken the survey more than once. Only the initial response was included in the final data set; all other duplicated responses were deleted. Also, four participants in Hollywood Park and five participants in Lakeway entered their access number, but did not respond to the survey. These responses were also deleted from the final data set. A total of seven responses had made-up access numbers and were deleted. The postal service returned 13 postcards from Hollywood Park and 51 postcards from Lakeway for reasons such as vacant household or not deliverable as addressed.

Of the 616 postcards sent to Hollywood Park, 156 (25.3%) households participated in the survey. Seven-hundred and four postcards were sent to Lakeway, 115 (16.3%) households participated in the survey. As mentioned previously, the minimum sample size required was doubled to offset potential non-response, therefore the adjusted response rate for Hollywood Park was actually 50.6% and Lakeway was 32.7%. Based on these response rates, the survey sampling error was less than 10% for both communities. Therefore, study results can be applied to the whole community of households in each city.

Forty-one respondents stated they lived right outside of Hollywood Park or Lakeway. This is an important factor to consider when analyzing results of this study. Residents in households outside of Hollywood Park and Lakeway may not have participated in the survey because they felt it did not pertain to them, though surrounding

communities typically have similar deer issues. AdMail used postal carrier routes to determine which households would be selected for the mailing list. Community maps were used to set boundaries, but unfortunately due to carrier route information, some households were not actually located in Hollywood Park or Lakeway. These responses were included in the final data set because the surrounding communities are currently dealing with similar deer issues.

Non-Response Follow Up

Non-response follow up postcards were sent to 258 households in Hollywood Park and Lakeway. Seventy-four residents from Hollywood Park (28.7%) and 56 residents from Lakeway (21.7%) responded. Figure 1 shows the response distribution as to why residents in Hollywood Park and Lakeway did not participate in the study.

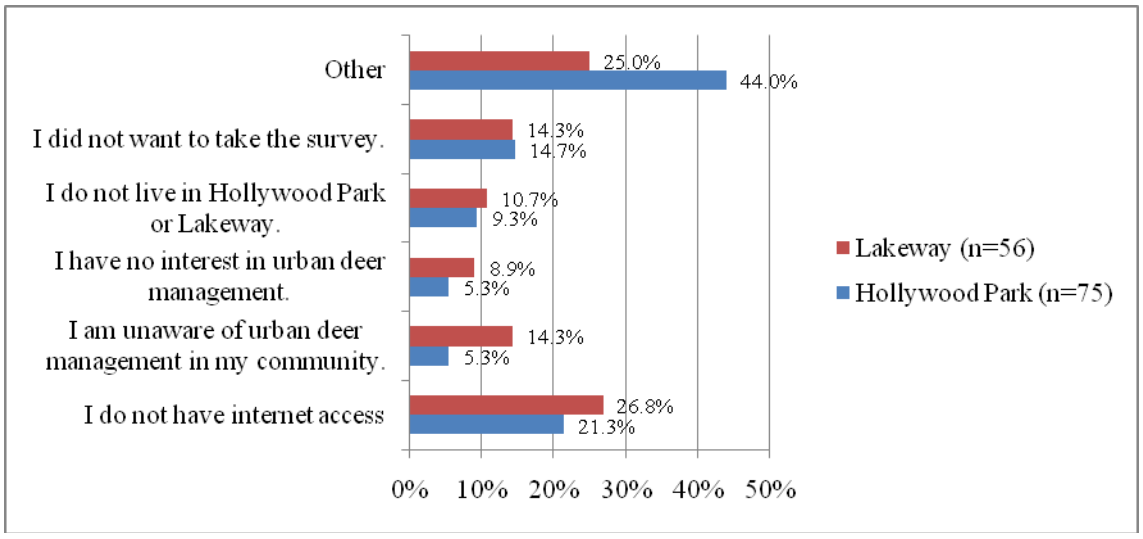

Figure 1. Residents' reasons for not responding to the survey.

Many Hollywood Park and Lakeway residents reported they did not have internet access, but would be interested in taking the survey if it was mailed to them. Unfortunately, due to time constraints of the study, the survey was not mailed to the respondents. The "Other" category consisted of responses that they did not receive the survey, forgot to take the survey, they tried but the web site was not working, just moved to this address, and never received the initial postcard to participate in the survey.

Community Demographics

The majority of respondents in Hollywood Park (97.9%) and Lakeway (99%) own their homes. There was no difference between communities in reference to gender, age, education level, or income of respondents. Hollywood Park respondents were 53.5% male and 46.5% female. Respondents in Lakeway were 53.6% male and 46.4% female. Age ranged from 25 to 87 years old, with the average age of 59 for Hollywood Park respondents and 56 for Lakeway respondents. Many participants in Hollywood Park (73.9%) and Lakeway (76.8%) had college degrees (i.e., Bachelor's, Master's, Ph.D. or Professional). The average income for both communities ranged from $90,000 to $119,000. There was little difference in the number of deer Hollywood Park and Lakeway residents see in their yards or in their communities (Figure 2). In fact, 43.6% of Hollywood Park and Lakeway residents stated that the number of deer in their community was just about right.

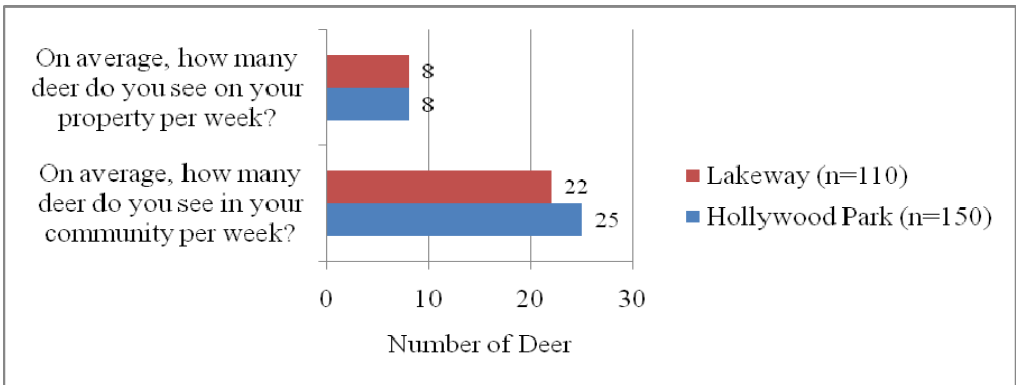

Figure 2. Average number of deer reported to have been seen in two Texas communities in 2008.

Respondents were asked to report the level of economic loss they have experienced due to deer herds in their community over the past two years (Table 2). Surprisingly, Hollywood Park and Lakeway residents have suffered minimal economic loss. According to State Farm (2006), the total number of deer-vehicle collisions has increased 6.3% in the United States over a year ago. Their data estimates the average property damage cost of deer-vehicle accidents was around $2,900 in 2007. Hollywood Park residents reported the majority of their economic loss came from replacement of landscape. However, Lakeway residents reported their major expense to be deer-vehicle collisions.

Social carrying capacity refers to opinions, attitudes and beliefs of a person, which can change over time depending on a person's experiences. West and Parkhurt (2002) evaluated interactions between deer damage, deer density, and stakeholder attitudes in Virginia. Their study revealed that respondents experiencing severe damage were more likely to consider white-tailed deer a nuisance and therefore support dramatic reductions in deer herds. It can be predicted that since Hollywood Park and Lakeway

respondents have suffered minimal economic loss, it is likely they will support little or no deer management in their communities.

Table 2
Average level of economic loss residents experienced due to deer herds in their community over the past two years

	HWP	LWY
Deer-vehicle collisions	$35.63	$126.52
Replacement of landscape shrubs	$109.66	$64.50
Loss of garden crops	$2.01	$2.61
Health related expenses	$0.42	$0
Other losses not listed above	$18.27	$0.35

Respondents were asked to select, from a list of 11, their favorite outdoor activities that involve wildlife (Figure 3). The majority of Hollywood Park and Lakeway respondents participated in non-consumptive wildlife activities such as wildlife observing or watching, nature walking, and bird feeding. According to the U.S. Department of the Interior (2001), Americans today are more likely to be involved in non-consumptive wildlife-related activities such as observing, feeding, and photography than traditional activities such as hunting and fishing. Chi square analysis showed community differences for only those respondents that reported they participate in boating. Lakeway residents were more likely to participate in boating probably because the community is located near Lake Travis.

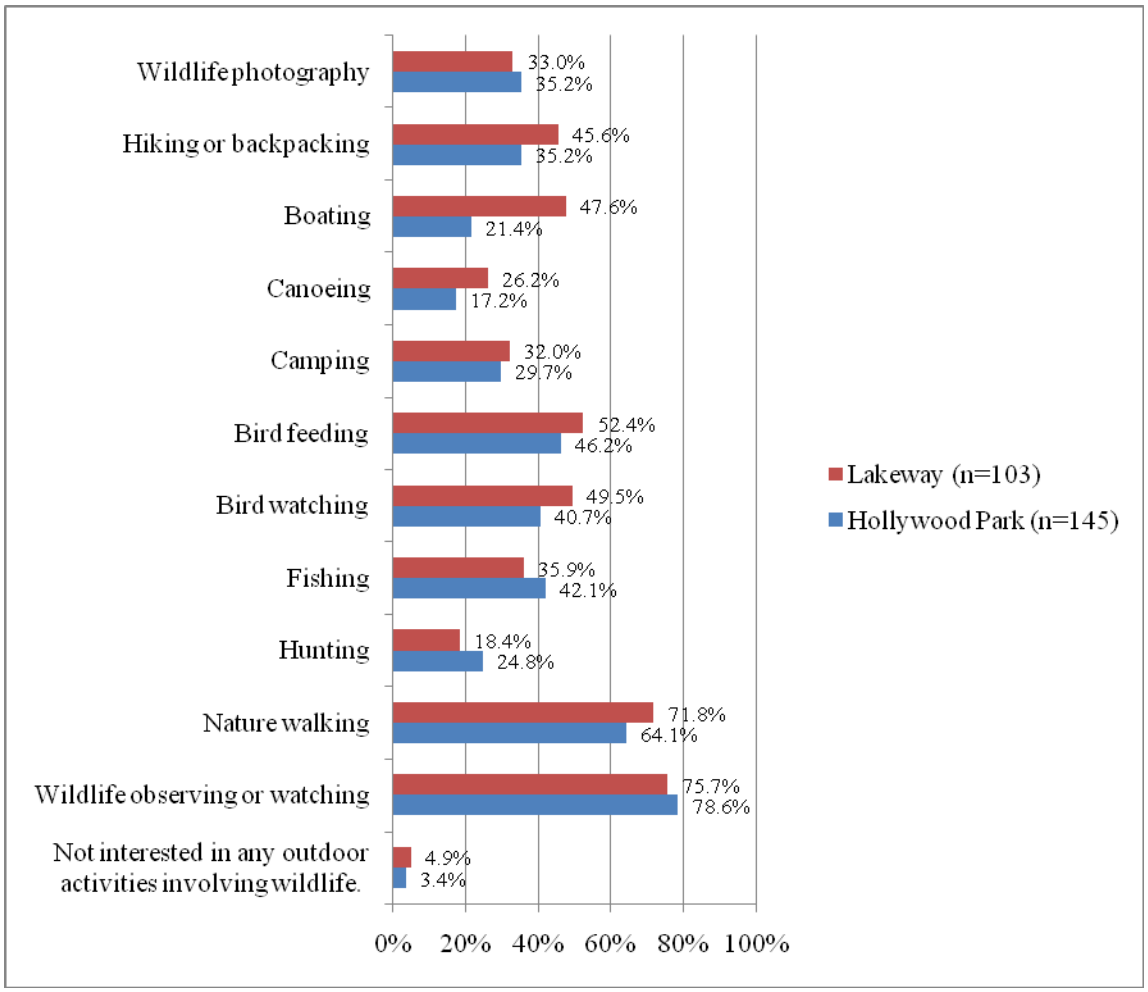

Figure 3. Respondents' favorite outdoor activities that involve wildlife.

However, there were community differences between in reference to how long respondents have lived in Texas and at their current residence (Table 3). Hollywood Park participants have lived in Texas and at their current residence longer than Lakeway participants. This information is important because since the 1990s, urban deer herds have negatively impacted Hollywood Park and Lakeway. Deer management techniques (i.e., TTT or TTP) began in 1999 for Lakeway and in 2001 for Hollywood Park. Both communities implemented a city ordinance, Lakeway in 2001 and Hollywood Park in

2002, which prohibits the feeding of deer, restricts public access to deer control areas, and assigns penalties for damage or destruction of deer control equipment. As of 2008, this ordinance is still in effect in both communities. The deer management program and city ordinance have caused major conflicts within both communities. (Charles Edwards, personal communication, April 24, 2007; Will Mangum, personal communication, February 24, 2007)

Table 3
Analysis of variance results of the number of years residents have lived in Texas and in their current household

	HWP	LWY	df	F	P
Texas resident [a]	41 years	30 years	1	17.915	<0.01
Lived at current residence [b]	15 years	8 years	1	23.368	<0.01

[a] t-test: t=4.3, df=227, P=<0.01
[b] t-test: t=5.327, df=235, P=<0.01

Charles Edwards stated that many residents in Lakeway have moved to the community over the past 10 years (supported in Table 3). This means that during the beginning stages of Lakeway's urban deer management program many of these residents were not living in the community and as a result are unaware of the major conflicts that have occurred over this issue. In fact, 39.9% of Lakeway respondents stated that they were unaware of a deer management program in their community.

Citizen Involvement in Deer Management

Understanding the level of citizen involvement in deer management activities in their community is important for the determination of residents' level of acceptance of urban deer management. Respondents were asked to identify various urban deer management activities they have personally conducted at their home or in the community. Chi square analysis showed a difference between communities in reference to several urban deer activities conducted by Hollywood Park and Lakeway residents (Table 4). For example, more Hollywood Park than Lakeway respondents attended meetings regarding deer management, protested deer control measures and advocated the removal of deer in their community, and allowed deer trapping on their property. Not a single respondent from Lakeway reported allowing deer trapping sites on their property. This was an interesting finding because it contradicts observations made during a deer trapping session in Lakeway. Multiple trap sites were located in close proximity to residents' homes and one trap site was even in someone's front yard. During the trapping session, several Lakeway residents came out and asked for up-dates on how many deer had been trapped for the day. Also, roughly 17% of respondents from each community admitted to feeding the deer, even though it is prohibited. Over half of Lakeway respondents stated that they did not participate in any of the urban deer activities listed in the question.

Table 4
Deer management activities conducted by residents in two Texas communities in 2008

	HWP (n=145)	LWY (n=104)	$\chi 2$ Value	P
Feed the deer in my community	17.9%	17.3%	0.025	0.874
Advocated for the removal of deer in my community *	20.7%	11.5%	3.695	0.055
Found a deer fawn	27.6%	20.2%	1.865	0.172
Rescued wounded deer	6.9%	8.7%	0.244	0.621
Allowed access to my property for deer trapping sites *	4.8%	0.0%	5.205	0.023
Protested deer control measures in my community *	15.2%	6.7%	4.264	0.039
Attended meetings regarding deer management in my community *	22.1%	4.8%	14.338	< 0.01
None of the above *	37.9%	60.6%	11.465	0.001

Note. Refer to question 5 in survey (Appendix A). df =1
* $P < 0.05$

Hollywood and Lakeway residents were then asked if they used any form of deer damage control methods in their community. Chi square analysis showed no difference between communities in reference to the types of deer damage control methods used by residents (Table 5). Three out of every four Hollywood Park and Lakeway respondents stated that they used plants that deer will not eat. Lakeway has a brochure available at the City Hall which provides an extensive list of deer resistant plants. Furthermore, a vast amount of information about deer resistant plants, repellents, and fences can also be found on the internet.

Table 5
Urban deer damage control methods used by residents in two Texas communities in 2008

	HWP (n=146)	LWY (n=106)	$\chi 2$ Value	P
Repellents	24.7%	19.8%	0.791	0.374
High fences	28.8%	24.5%	0.53	0.467
Use plants that deer will not eat	79.5%	74.5%	0.678	0.410
Protect plants using tree shelters, wire cages or plastic netting	30.1%	26.4%	0.391	0.532
Allow deer trap sites on my property	6.2%	1.9%	2.671	0.102
None of the above	15.1%	22.6%	2.378	0.123

Note. Refer to question 7 in survey (Appendix A). df =1

Additional questions determined how Hollywood Park and Lakeway residents have become involved in the decision-making process regarding deer management in their communities. For example, residents were asked what type of stakeholder group they would represent if they were in a "Deer Action" committee. They were directed to select all that apply. Chi square analysis indicated that more Hollywood Park than Lakeway respondents would represent someone who wants to save the deer and someone who is a disgruntled landowner (Table 6). A disgruntled homeowner can mean the resident was angry with current deer management strategies or upset that the deer have eaten hundreds of dollars of landscape in their front yard. No matter what the reason, the resident is still a disgruntled homeowner and their issues should be addressed accordingly.

Residents in these two communities are polarized. Slightly more than half of the respondents in Hollywood Park and Lakeway want to save the deer and the other half

want to reduce the size of the deer herd. Overall, this information shows that the residents in Hollywood Park and Lakeway represent a variety of stakeholder groups. It is important to understand that residents will have different opinions about urban deer management due to their knowledge base and understanding of deer management activities as well as their experience with the deer in their community.

Table 6
Type of stakeholder groups that residents in two Texas communities would represent in a "Deer Action" committee

	HWP (n=141)	LWY (n=97)	$\chi 2$ Value	P
Those who want to save the deer	56.7%	60.8%	0.026	0.872
Those who object to hunting	27.0%	36.1%	1.476	0.224
Those who object to urban wildlife management	5.7%	10.3%	1.461	0.227
Those who dislike the deer for various reasons	9.2%	7.2%	0.434	0.510
A city official	2.1%	4.1%	0.678	0.410
Those who want to reduce the size of the deer herd *	53.9%	42.3%	4.183	0.041
A hunter	12.1%	11.3%	0.094	0.759
The media	0.0%	1.0%	1.387	0.239
Animal rights representative	16.3%	21.6%	0.716	0.397
A representative of the state game agency	5.0%	3.1%	0.613	0.434
Disgruntled homeowner *	19.9%	7.2%	8.016	0.005

Note. Refer to question 19 in survey (Appendix A). df = 1
* $P < 0.05$

Deer Management Preferences

Typically, when deer first appear in urban habitats, humans consider them to be beautiful, non-threatening, and a highly valuable wildlife resource, but when deer become overabundant, conflicts may arise between deer and people. Human reactions to wildlife include a broad spectrum of emotions and reactions based on previous exposure to education programs and personal experience (Kellert, 1980). Communities seldom want to completely eliminate the deer population, but any management technique can become a controversial issue (Kilpatrick & Walter, 1997; Stout et al., 1997). For instance some people may want the deer to be removed or controlled using nonlethal methods, while others due to unpleasant encounters with overabundant urban deer herds will support lethal management methods (Decker & Gavin, 1987). Selected residents in Hollywood Park and Lakeway were asked whether they favor or oppose any efforts to reduce the size of the deer herd in their community. Analysis of variance and t-tests showed that there is a difference between communities (Table 7). Overall, 48.6% of Hollywood Park respondents and 30.2% of Lakeway respondents favored urban deer management. In Hollywood Park, 41.9% respondents and 50.9% Lakeway respondents opposed any efforts to reduce deer herds in their community.

Table 7
Residents' responses to deer management in two Texas communities in 2008

	Hollywood Park (n=148)	Lakeway (n=106)
Strongly favor	24.3%	14.2%
Favor	24.3%	16.0%
Not sure	9.5%	18.9%
Oppose	23.0%	26.4%
Strongly oppose	18.9%	24.5%

Note. Refer to question 8 in survey (Appendix A).
ANOVA: F=5.583, df=1, P=0.019; t-test: t=-2.363, df=252, P=0.018

An additional question asked Hollywood Park and Lakeway residents to rank a series of eleven alternative urban deer management options using a 5-point Likert scale ranging from very unacceptable to very acceptable. Analysis of variance and t-tests confirmed differences between communities for seven of the 11 alternative urban deer management options (Table 8). Overall, Hollywood Park and Lakeway respondents reported that using fertility control and capturing and relocating the deer were considered to be acceptable deer management practices. All other methods listed were considered unacceptable deer management methods by both Hollywood Park and Lakeway residents.

Table 8
Acceptable methods of managing urban deer herds in two Texas communities, Hollywood Park (n=152) and Lakeway (n=110), in 2008

	Very Unacceptable		Unacceptable		No Opinion		Acceptable		Very Acceptable	
	HWP	LWY	HWP	LWY	HWP	LWY	HWP	LWY	HWP	LWY
Do nothing at all. [a]	37.1%	26.7%	32.9%	21.8%	10%	17.8%	14.3%	19.8%	5.7%	13.9%
Allow closely regulated hunting with firearms. [b]	72.1%	58.4%	16.4%	17.8%	2.9%	3%	5.7%	14.9%	2.9%	5.9%
Allow closely regulated hunting with bow and arrow. [c]	65.7%	52%	15%	18.6%	5.7%	3.9%	9.3%	16.7%	4.3%	8.8%
Do nothing and allowing nature to take its course. [d]	38.1%	24.5%	31.7%	22.5%	7.9%	10.8%	14.4%	26.5%	7.9%	15.7%
Use fertility control.	4.8%	7.9%	9.6%	8.9%	14.4%	17.8%	39%	41.6%	32.2%	23.8%
Train and supervise qualified volunteers to shoot deer with firearms. [e]	63.8%	54.5%	19.9%	18.8%	5.7%	5%	7.1%	14.9%	3.5%	6.9%
Build fences to keep deer away from homes, roads, and parks.	24.8%	20.6%	30.5%	28.4%	14.2%	16.7%	22.7%	26.5%	7.8%	7.8%
Chang the habitat so that deer have no place to live near people.	43.2%	42.2%	38.1	31.4%	11.5%	17.6%	3.6%	5.9%	3.6%	2.9%
Capture deer and process the meat.	31.4%	32.7%	20.7	15.8%	6.4%	5.9%	29.3%	32.7%	12.1%	12.9%
Capture the deer and move them somewhere else. [f]	5.6%	13%	10.6	14%	7.7%	9%	37.3%	45%	38.7%	19%

Table 8
Continued

	Very Unacceptable		Unacceptable		No Opinion		Acceptable		Very Acceptable	
	HWP	LWY	HWP	LWY	HWP	LWY	HWP	LWY	HWP	LWY
Hire professional sharpshooters. [g]	71.6%	55.9%	14.2	21.6%	5%	2.9%	3.5%	13.7%	5.7%	5.9%

Note. Refer to question 15 in survey (Appendix A).
[a] ANOVA: F=9.831, df=1, P=0.002; t-test: t=-3.071, df=239, P=0.002
[b] ANOVA: F=7.633, df=1, P=0.006; t-test: t=-2.642, df=239, P =0.009
[c] ANOVA: F=5.773, df=1, P=0.017; t-test: t=-2.334, df=240, P =0.021
[d] ANOVA: F=12.839, df=1, P<0.001; t-test: t=-3.071, df=239, P =0.002
[e] ANOVA: F=4.750, df=1, P=0.030; t-test: t=-2.105, df=240, P =0.037
[f] ANOVA: F=9.608, df=1, P=0.002; t-test: t=3.047, df=240, P =0.003
[g] ANOVA: F=4.998, df=1, P=0.026; t-test: t=-2.183, df=241, P =0.030

Citizens' Expectations of Deer Management Outcomes

Respondents were asked to identify what they considered to be evidence of a successful urban deer management program. Few differences emerged between communities on this question. However, Chi square analysis indicated that more Hollywood Park than Lakeway residents considered loss of a distinct browse line evidence of a successful management program (Table 9).

Table 9
What residents consider to be evidence of a successful urban deer management program in two Texas communities in 2008

	HWP (n=140)	LWY (n=96)	$\chi 2$ Value	P
Reduced number of deer-vehicle collisions [a]	40.7%	47.9%	0.499	0.48
Decrease native habitat loss [a]	32.1%	37.5%	0.291	0.589
Improved health of the herd [a]	60.0%	55.2%	1.283	0.257
Loss of a distinct browse line [a] *	15.7%	1.0%	14.663	<0.01
Survival of more deer per acre	20.0%	15.6%	1.065	0.302
Removal of all deer in the community	9.3%	4.2%	2.542	0.111
Reduced loss of ornamental landscaping [a]	35.0%	27.1%	2.31	0.129
Lowered fertility rates in the deer herd	34.3%	29.2%	1.162	0.281
Reduced number of resident complaints [a]	23.6%	25.0%	<0.01	0.983
It is impossible to successfully manage urban deer herds	6.4%	10.4%	0.953	0.329

Note. Refer to question 11 in survey (Appendix A). df=1
* $P < 0.05$
[a] Considered evidence of a successful urban deer management program

Overall, the majority of Hollywood Park and Lakeway residents reported that improved health of the deer herd and reduced number of deer-vehicle collisions would also be evidence of a successful urban deer management program. Only 16.8% Hollywood Park and Lakeway respondents combined believed that it was impossible to successfully manage urban deer herds.

It is unknown as to how residents determine the health of the deer herd. The physical appearance of the deer is not the only determining factor; it is more complex than that. Many residents do not understand the importance of biological carrying capacity. Biological carrying capacity refers to the maximum number of individuals that a specific environment can support without causing detrimental effects. If urban deer herds are unmanaged, the environment would not be capable of supporting the overabundant deer herd, resulting in increased disease, starvation, stress, parasites and even death of the deer. An overabundant deer population also negatively impacts the ecosystem. A ten-year study of deer in northwestern Pennsylvania documented the negative impacts on ecosystems caused by overabundant deer herds (McShea, Underwood, & Rappole, 1997). When deer densities exceeded 7.9 deer/km^2, there were significant decreases in some songbird species abundance as well as vegetation. McShea (1997) stated that "passive deer management may result in reductions of species richness and abundance, causing shifts in composition of plant and animal communities."

Hollywood Park and Lakeway participants were asked to rank the most salient issues, from a list of ten, which needed to be considered in an urban deer management program. Their selection was based on a 5-point Likert scale ranging from never to

always. Analysis of variance revealed differences between communities in reference to the issue that deer do not suffer and the management program works quickly (Table 10).

Lakeway respondents were much more concerned that the deer do not suffer. The majority of Hollywood Park and Lakeway respondents always considered: the health of the deer herd, safety around people, deer fatalities, humane methods, deer suffering, and deer coexisting with humans. Respondents sometimes considered cost to tax payers, method is easy to use, works quickly and is similar to the way nature would balance the herd.

Citizens' Knowledge about Urban Deer Ecology and Management

In order to assess residents' knowledge of deer management activities occurring in their community, they were asked to identify how deer management is currently being conducted in their community (Table 11). As discussed earlier, Lakeway is currently using the TTP method and Hollywood Park is practicing TTT (tranquilizing) method to control deer in their communities. Hollywood Park respondents were more aware of current deer management in their community then Lakeway respondents. As mentioned earlier, Lakeway residents reported to have lived at their current residence for eight years. This means that during the beginning stages of Lakeway's urban deer management program many of these residents were not living in the community and as a result are unaware of the major conflicts that have occurred over this issue. A total of 40.9% of Hollywood Park and Lakeway respondents stated that they were unaware of a deer management program in their community.

Table 10
Types of issues considered by residents concerning deer management in two Texas communities in 2008

	Never		Almost Never		Sometimes		Almost Always		Always	
	HWP	LWY	HWP	LWY	HWP	LWY	HWP	LWY	HWP	LWY
Health of the deer	5%	2%	2.9%	2%	19.3%	21%	35.7%	31%	37.1%	44%
Safety around people	8.6%	7.1%	6.5%	8.2%	23.7%	21.4%	28.8%	25.5%	32.4%	37.8%
Never fatal to deer	15.1%	17.3%	13.7%	11.2%	22.3%	20.4%	23.7%	13.3%	25.2%	37.8%
Method is humane	3.5%	6.1%	2.1%	2%	18.8%	11.2%	27.1%	21.4%	48.6%	59.2%
Similar to the way nature would balance the herd	16.7%	11.1%	9.4%	10.1%	32.6%	31.3%	25.4%	29.3%	15.9%	18.2%
Deer do not suffer [a]	6.3%	6%	7%	1%	16.9%	13%	30.3%	22%	39.4%	58%
Cost to taxpayers	12.8%	15.3%	12.1%	9.2%	34.8%	27.6%	22.7%	24.5%	17.7%	23.5%
Easy to use	10.8%	15.5%	13.1%	17.5%	33.8%	30.9%	26.9%	21.6%	15.4%	14.4%
Works quickly [b]	13.9%	23.5%	19%	18.4%	31.4%	32.7%	20.4%	14.3%	15.3%	11.2%
Allows deer to coexist with humans	9.3%	6%	4.3%	5%	20.7%	18%	30%	24%	35.7%	47%

Note. Refer to question 14 in survey (Appendix A).
[a] ANOVA: F=5.529, df=1, P=0.020; t-test: t=-2.378, df=221, P =0.018
[b] ANOVA: F=3.867, df=1, P =0.050; t-test: t=1.959, df=206, P =0.05

Table 11
What residents know about deer management activities
in two Texas communities in 2008

	Hollywood Park (n=144)	Lakeway (n=90)
There is no management program that I am aware of.	15.3%	25.6%
Capturing/Tranquilizing and relocating the deer	79.9%	51.1%
Capturing and processing the meat	3.5%	21.1%
Fertility control	1.4%	1.1%
Regulated hunting with fire arms	0.0%	0.0%
Regulated archery hunting	0.0%	1.1%

Note. Refer to question 9 in survey (Appendix A).

Residents were asked to identify who makes the decisions about how deer are managed in their community. Chi square analysis showed more Hollywood Park than Lakeway respondents believed that the city council, animal rights activist, and TPWD made the decisions about how deer are managed in their community (Table 12). However, the majority (84 to 86%) of Hollywood Park and Lakeway residents stated that the City Council decided how deer were going to be managed in their community (which is correct). The city mayor and county judge also play a role in the decision making process. TPWD is not responsible for making decisions about how deer are managed in communities, though many Hollywood Park and Lakeway residents believed the agency is involved. How the TPWD becomes involved in urban deer management is discussed later.

Table 12
Residents' responses to whom they believe makes decisions about how deer are managed in two Texas communities in 2008

	HWP (n=138)	LWY (n=77)	$\chi 2$ Value	P
City Council *	86.2%	84.4%	11.25	0.001
Animal Rights Activist *	5.8%	0.0%	5.972	0.015
Property Owner Association	8.0%	9.1%	0.076	0.783
City Mayor	24.6%	23.4%	1.446	0.229
County Judge	1.4%	2.6%	0.107	0.743
Residents of the community	18.8%	24.7%	0.001	0.972
Texas Parks and Wildlife Department *	32.6%	20.8%	8.103	0.004

Note. Refer to question 10 in survey (Appendix A).
* $P<0.05$

Hollywood Park and Lakeway residents were asked which method of deer management was most expensive (Table 13). For this question, community was not a determining factor in responses. However, more Hollywood Park than Lakeway residents identified the trap and relocate method as the most expensive method, but more Lakeway than Hollywood Park residents felt that the tranquilize and relocate method was the most expensive. Residents in these two communities do not appear to be well informed about the general costs of deer management options.

Table 13
Comparing residents in two Texas communities selections of the most expensive method of deer management in 2008

	Hollywood Park (n=143)	Lakeway (n=100)
Trap and relocate	41.3%	34.0%
Trap and process	6.3%	3.0%
Tranquilize and relocate	28.7%	38.0%
Fertility control	23.8%	25.0%

Note. Refer to question 18 in survey (Appendix A).

There are four general methods of fertility control: surgical sterilization, synthetic steroids hormones, immunocontraception, and contragestation. Fertility control methods do not offer immediate population reduction results. Fertility control has not yet been proven to be an effective method causing a decline in urban deer populations (Warren, 2000). Previous studies prove fertility control to be expensive and infeasible for practical implementation (Fagestone, 2002). In North America, treatment of deer with contraceptive vaccines is only being conducted in research projects (DeNicola, VerCauteren, Curtis, & Hygnstrom, 2000).

The trap and relocate method tends to be the least expensive deer management option, especially if the community owns their own trapping equipment. According to Will Mangum, TTT costs about $110 per deer. If the community owns trapping equipment, the trapper and relocation costs are covered by the individual who receives the deer. As mentioned earlier, a small percentage of relocated deer must be tested for Chronic Wasting Disease before they can be transported. The testing cost averages about

$150 per deer. Similar cost occur when the tranquilize and relocated method is used, but then the price of tranquilizers is added to the total cost.

According to Charles Edwards, it costs about $200 to trap and process one deer. The trapper expense is roughly $75 per deer, processor expense averages $60 per deer, and other costs include corn and drop net release system repairs. The budget for the 2006-2007 Lakeway trapping season was $32,000.

Hollywood Park and Lakeway residents were asked to identify how the TPWD was involved in urban deer management. The primary role of the TPWD is to provide technical guidance for communities facing deer management problems. First, a TPWD biologist will assess the size of deer herds and advise the city council on how to deal with their urban deer population. TPWD staff also visit communities to help form deer action committees, issue permits for the community to legally manage the deer herd, and enforces the game laws associated with urban deer management. On the TPWD web page (http://www.tpwd.state.tx.us/), the public has access to three informational papers/brochures: Living with Overabundant White-tailed Deer in Texas, Local Deer Control Methods, and Deer Management Within Suburban Areas.

Chi square analysis revealed community differences in all but two statements in the question (Table 14). The majority of Hollywood Park and Lakeway respondents knew that the TPWD did not provide funding to implement deer management in their communities. Only a small percentage of Hollywood Park (6%) and Lakeway respondents (2%) knew that the TPWD was not involved in managing deer in urban communities. More than half of Lakeway respondents, and slightly less than half of

Hollywood Park respondents, reported that they were unsure how TPWD was involved in urban deer management. This information can be used to help develop educational material for the public that will allow them to better understand the role of the TPWD in urban deer management. No literature could be found regarding Texas residents' perceptions of the involvement of the TPWD in urban deer management.

Table 14
How residents in two Texas communities in 2008 perceive the involvement of Texas Parks and Wildlife in urban deer management

	HWP (n=147)	LWY (n=105)	$\chi 2$ Value	P
Issue permits for the community to legally manage their urban deer herd *	44.2%	18.1%	19.037	< 0.01
Visit communities to help form deer action committees *	28.6%	12.4%	9.622	0.002
Assess size of deer herds in communities *	40.8%	20.0%	12.414	< 0.01
Advise communities on how to deal with their urban deer issues *	46.3%	23.8%	13.502	< 0.01
Participate in reducing the size of the urban deer herd *	29.3%	13.3%	9.079	0.003
Provide funding to implement urban deer management	11.6%	5.7%	2.616	0.106
Enforce the game laws associated with urban deer management *	33.3%	20.0%	5.633	0.018
Texas Parks and Wildlife Department is not involved in managing the deer in urban communities.	6.1%	1.9%	2.671	0.102
I am not sure. *	48.3%	76.2%	17.691	< 0.01

Note. Refer to question 20 in survey (Appendix A).
* P<0.05

In order to assess the knowledge base of Hollywood Park and Lakeway residents about urban deer ecology and management, respondents were asked a series of sixteen questions (Table 15). Residents' responses to each statement were re-coded in SPSS to represent an overall score of the number of correct answers given. If the respondent answered the question correctly, they were given a score of 1. If the respondent answered the question incorrectly or responded "not sure" they were given a score of 0. The overall score represented the total number of correctly answered questions. Analysis of variance showed no difference between communities' overall scores. The score range was from five to a perfect score of 16, with the mean score for Hollywood Park equal to 10.26 and Lakeway equal to 10.27. Overall, Hollywood Park and Lakeway residents seem to be moderately informed about deer ecology and management.

Survey Comments

The last question of the survey asked if the respondent had any additional comments they would like to share (Appendix E). Sixty-seven Hollywood Park participants and 36 Lakeway participants responded to this question. Many respondents stated that they moved to Hollywood Park or Lakeway because of the deer and that they enjoy having deer in their community. Participants in both communities also stated that the presence of deer adds value to their homes and overall their community. There were many comments about saving the deer, respondents stating "the deer were here first, leave them alone" and "don't do anything to harm the deer, they are not harming us." Other participants commented that they appreciated the opportunity to voice their

opinion and they looked forward to the results of the survey. Overall, Hollywood Park and Lakeway respondents commented on the same types of issues.

Table 15
Answers to deer ecology and management statements given to residents in two Texas communities in 2008

Statement [a]	Fact or Fiction
The size of urban habitats prevents deer herds from growing too large.	Fiction
Urban deer can carry diseases that affect humans.	Fact
Urban deer can destroy habitat used by other animals.	Fact
In order to survive, urban deer rely heavily on supplemental food sources.	Fact
Urban deer can begin to produce fawns when they are six months old.	Fact
Twins are a common result from urban deer reproduction.	Fact
More deer per acre means the deer will be physically larger in size.	Fiction
The most common cause of death in urban deer herds is predators.	Fiction
The least common cause of death in urban deer herds is disease and starvation.	Fiction
Deer are an endangered species in Texas.	Fiction
Deer live in urban areas because they have adapted to living near people.	Fact
People can help urban deer he most by letting nature take its course.	Fiction
Deer live in urban areas because human development has pushed them out of their natural habitat.	Fact
People have done more harm than good for urban deer.	Fact
People can help urban deer the most by managing them.	Fact
Fertility control techniques for managing urban deer are cost effective and easy to implement.	Fiction

Note. Refer to question 21 in survey (Appendix A).
[a] ANOVA: F=0.002, df=1, P=0.966

4. CONCLUSION

Overall, Hollywood Park and Lakeway appear to be homogenous groups. They have similar demographic characteristics, participate in non-consumptive wildlife related activities, and have experienced a minimal amount of economic loss due to deer herds within their community. The current deer management programs seem to be effectively controlling the deer populations in these communities. Residents want to coexist with the deer. However, if deer managers suddenly stopped management activities, deer populations would soon exceed the biological carrying capacity. At this point, residents would experience more economic losses and increased deer-human encounters, and begin to perceive the deer as a nuisance animal. Deer would have crossed the line in terms of residents' social carrying capacity.

This study was dedicated to test four hypotheses. The first hypothesis, there will be no community differences in citizen involvement in deer management ($_1H_o$), was partially supported. Community differences were found in several deer management activities conducted by residents. Hollywood Park residents tend to be more active than Lakeway residents in advocating the removal of deer, allowing trap sites on their property, protesting deer control measures, and attending meetings about deer management. Over half of Lakeway respondents reported they did not participate in any deer management activities. Chi square analysis showed no community difference in reference to the types of deer damage control methods used by residents.

The second hypothesis, there will be no community differences in deer management preferences, ($_2$Ho), was also partially supported. Analysis of variance and t-

tests supported a difference between communities regarding efforts to reduce the size of the deer herd in their community. Hollywood Park and Lakeway residents ranked a series of 11 alternative urban deer management options using a 5-point Likert scale ranging from very unacceptable to very acceptable. Analysis of variance and t-tests confirmed differences between communities in seven of the 11 alternative urban deer management options. Overall, Hollywood Park and Lakeway respondents reported that using fertility control and capturing and relocating the deer were considered to be acceptable deer management practices.

The third hypothesis, there will be no community differences in the types of deer management outcomes citizens expect ($_3H_o$), was partially supported. Chi square analysis indicated that more Hollywood Park than Lakeway residents considered loss of a distinct browse line as evidence of a successful management program. Participants were asked to rank the most salient issues, from a list of ten, which needed to be considered in an urban deer management program. Analysis of variance revealed differences between communities in reference to the issue that deer do not suffer and the management program works quickly. Lakeway respondents were much more concerned that the deer did not suffer.

Finally, the fourth hypothesis, there will be no community differences in citizens' knowledge about urban deer ecology and management ($_4H_o$), was also partially supported. Chi square analysis showed community differences in that Hollywood Park respondents tend to believe that the city council, animal rights activist and TPWD made

decisions about how deer are managed in their community. Both communities had a similar low knowledge base about deer ecology and management.

The information derived from this study revealed the public's knowledge, attitudes, actions, and expectations concerning over-abundant white-tailed deer populations in two Texas communities. This information can now be used to assist communities such as Lakeway and Hollywood Park, as well as the TPWD, to determine the type of educational materials needed to provide relevant, current, and accurate information about urban deer ecology and management. In 1995, Bright and Manfredo reported that when citizens have the most current information on particular issues, their attitudes are more likely to predict their behavior regarding natural resource problems as well as management decisions. Determining the public's concerns about urban deer management and distributing information addressing those concerns is most likely to influence perception of urban deer management techniques (Lauber & Knuth, 2004).

It is important for managers to understand that when dealing with the public, a variety of issues will arise from different stakeholder groups. These issues must be addressed before management programs are implemented in order to reduce the potential conflict between managers and residents. Public education is an extremely important management implication as is an understanding of urban deer management methods.

In the questionnaire, over half of the residents in Hollywood Park and Lakeway answered the following "fact or fiction" statements incorrectly: fertility control techniques for managing urban deer are cost effective and easy to use; people can help urban deer the most by letting nature take its course; the least common cause of death in

urban deer herds is disease and starvation; urban deer can begin to produce fawns when they are six months old; and in order to survive, urban deer rely heavily on supplemental food sources. Less than half of Lakeway residents knew that twins are a common result deer reproduction. Over half of Lakeway residents believed that the size of urban habitats prevented deer herds from growing too large (which is not true). It is also important to understand the public's perceptions of urban deer management costs particularly when they compare fertility control to TTT and TTP. As previously mentioned, over half of Hollywood Park and Lakeway respondents believed that fertility control is cost effective and easy to use.

Residents were asked to specify their preferred methods of delivering educational materials (Figure 4). The majority of Hollywood Park and Lakeway residents preferred educational materials about urban deer ecology and management delivered by a community news letter. About half of Hollywood Park residents were interested in question and answer public meetings. A community newsletter could serve as an educational tool as well as an up-date on deer management in the community.

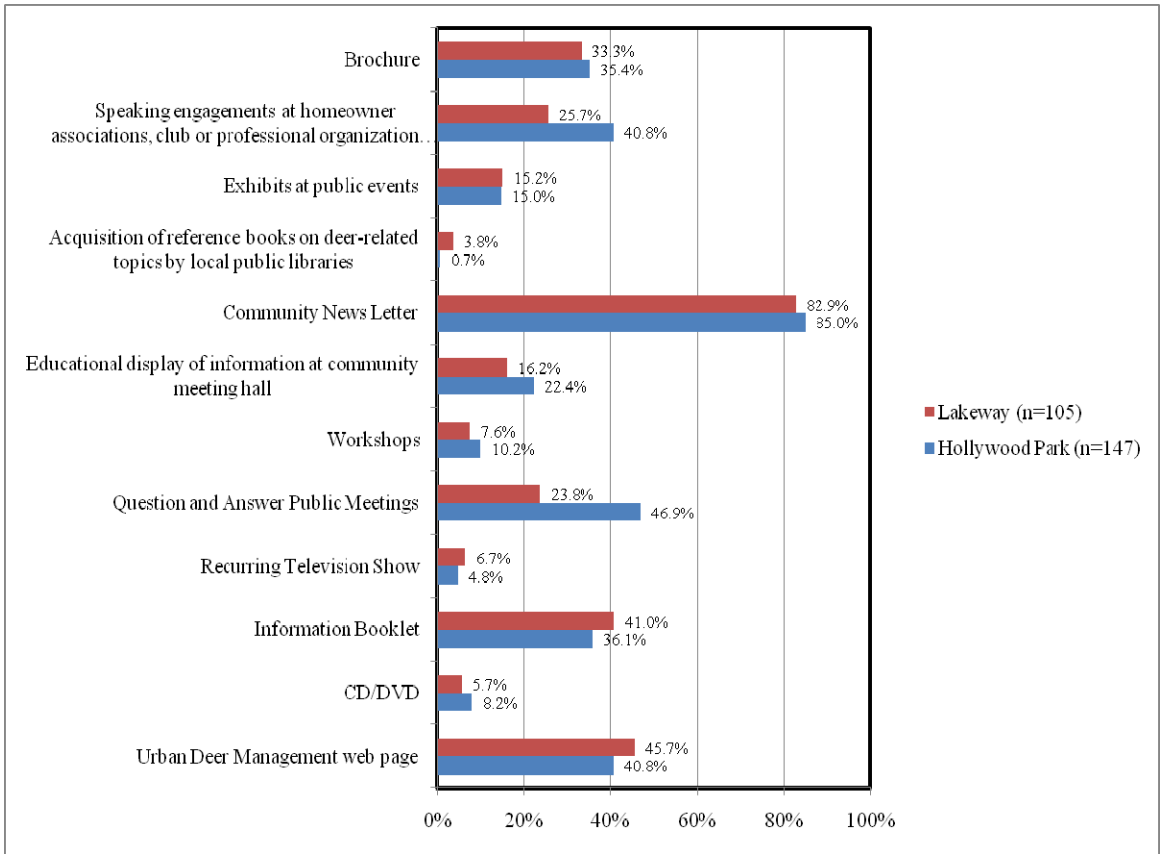

Figure 4. Preferred methods of delivering educational materials about urban deer ecology and management.

Hollywood Park has a web page (http://www.hollywoodpark-tx.gov) which includes a variety of information about the city including a deer management report. The report covers a variety of information such as identification of problems, population control methods, estimated costs, and management implications. The city of Lakeway also has a web page (http://cityoflakeway.com) which contains information about the deer feeding ban and deer resistant plants. Websites can be an excellent method for residents to get information about deer management in their communities, but it is important that they have internet access and the site is up-dated regularly. Since 41.8%

of Hollywood Park and Lakeway residents reported in the non-response follow up that they did not have internet access, communities may consider offering alternative forms of educational materials. For example, Lakeway has a brochure, *Living with Deer in Lakeway*, available in the City Hall lobby. The level of effectiveness of these brochures in transferring information about urban deer management of Lakeway residents has not been determined.

Fairfax County in Virginia is an example of a county that does an excellent job of public outreach concerning urban wildlife. The county has allotted airtime on a local television station to provide a recurring show about urban wildlife. Question and answer sessions are held frequently in order to address any issues that the public wants to discuss concerning urban wildlife issues. They distribute postcard directing residents to visit their web page (http://www.fairfaxcounty.gov/comm/deer/deermgt.htm). Fairfax County effectively uses the Internet to post updates of information on deer control efforts and deer-related human safety issues. The web page is updated as new information becomes available. Informational displays are posted at visitor centers, nature centers, libraries, community centers and other public facilities.

Study Implications

White-tailed deer population densities throughout the United States are reaching unprecedented levels, especially in urban and suburban areas (Curtis & Richmond, 1992). The methods of this study can serve as a useful tool for others to develop pro-active public assessment efforts about over-abundant urban white-tailed deer populations, and aid in reducing the conflict between urban deer managers and the

public. As urban sprawl rapidly continues throughout the United States, many other urban wildlife issues will arise. These methods can also be used to reveal the public's knowledge, attitudes, actions, and expectations towards other urban wildlife species such as feral hogs or coyotes. The main sections and outline of the survey can remain the same, tailoring questions to pertain to the specific species.

In future use, investigators may want to consider offering an alternative form of response, such as a paper version of the survey available upon request. An investigator can then send the resident a survey packet which includes a return envelope with paid postage, which allows the respondent to simply fill out the survey and place it in the mail. Investigator contact information, i.e., work or school address and e-mail, needs to be included on the survey invitation postcards so respondents have a contact to answer questions. For this study, residents sent 24 email messages and four letters. The majority of the email messages concerned access to the survey site and how the survey results would be published.

Other approaches for data analysis (i.e., multivariant analysis) can be conducted in the future evaluating the interrelationship between variables such as reported economic loss and beliefs about deer management practices. It would be expected that the more money residents lose due to the deer in their community, the more frustrated they will become and eventually support a more aggressive form of deer management.

This study found that many Hollywood Park and Lakeway residents lacked basic knowledge about deer ecology and management. They were unfamiliar with deer biology, the consequences of not managing urban deer herds, and many Lakeway

residents were unaware of deer management practices within their community. As suggested by Hollywood Park and Lakeway respondents, a community newsletter could serve as a useful tool to provide the baseline information to educate the public about urban deer ecology and management. Based on the results of this study, the newsletter should address factors involved in choosing appropriate and effective management strategies, recognition of the different stakeholder groups, how deer are being managed in the community, TPWD involvement in urban deer management and identification of who is really in charge, and population dynamics of urban deer herds and ecological impacts.

Of particular importance is the last component in the previous list. Urban residents need to understand the meaning of biological carrying capacity (K) as it relates to deer herds, and what are the observable and measurable population indicators when carrying capacity is exceeded (e.g., declining body weights and reduced fawn crops). This is important because the homeowner's definition of "herd health" and the actual status of herd health may be two different things. One study specifically addressed and gave examples of various scenarios of relative deer densities (e.g., low, low to moderate, moderate to high, and high) and associated affects on local flora and fauna and deer population dynamics (deCalestra & Stout, 1997). They suggest that as relative density increases, so does habitat destruction, but deer recruitment nears zero as K is approached.

Community newsletters may be the best method of communicating with urban residents. Newsletters can easily be updated as new information or issues arise.

Consideration should also be given to public school programs that address urban deer management in communities with overabundant deer herds, e.g., “Living With White-tailed Deer,” produced by Quality Deer Management Association.

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APPENDIX A

SURVEY INSTUMENT

Urban Deer

1. Invitation and Explanation

Thank you for visiting our survey website. You represent one of the households in Hollywood Park or Lakeway invited to participate in a survey about urban deer management in each community. Your responses are confidential so we encourage you to answer all of the questions. In order to randomize household member representation, please select an adult occupant who will have the next birthday to answer survey questions. It should take about 25 minutes to complete this survey. If you have any questions about this survey, contact Dr. Clark E. Adams at clark.adams@tamu.edu or Jessica Alderson at jalderson@tamu.edu.

*** 1. Begin by entering the four-digit access number printed above your address on the invitation card.**

Access Number

White-tailed Deer in Lakeway, TX
Picture Taken By: Greg DeLong

Urban Deer

2. Urban Deer in Your Commnity

2. On average, how many deer do you see in your community per week? If none, enter 0.

Number of deer:

3. On average, how many deer do you see on your property per week? If none, enter 0.

Number of deer:

4. Which of the following statements best expresses your opinion about the number of deer in your community?

- ◯ The number of deer in my community is just about right.
- ◯ There are too many deer in my community.
- ◯ There are not enough deer in my community.
- ◯ I have no opinion about the number of deer in my community.

Other (please specify)

5. Please indicate whether any of the following activities pertained to you within the last year or two. (Check all that apply)

- ☐ Fed the deer in my community.
- ☐ Advocated for the removal of deer in my community.
- ☐ Found a deer fawn.
- ☐ Rescued wounded deer.
- ☐ Allowed access to my property for deer trapping sites.
- ☐ Protested deer control measures in my community.
- ☐ Attended meetings regarding deer management in my community.
- ☐ None of the above

Other (please specify)

6. For the reasons listed below, what level of economic loss (actual or estimated dollars) have you experienced because of the deer herds in your community over the past two years? Please enter a 0 in each box if there was no economic loss in that category.

Deer/vehicle collisions	
Replacement of landscape shrubs	
Loss of garden crops	
Health related expenses	
Other losses not listed above	

Urban Deer

7. Which of the following methods have you used to control urban deer damage to your property? (Check all that apply)

- [ ] repellents
- [ ] high fences
- [ ] use plants that deer will not eat
- [ ] protect plants using tree shelters, wire cages or plastic netting
- [ ] allow deer trap sites on my property
- [ ] none of the above

Other (please specify)

Urban Deer

3. Managing Urban Deer Herds

We would like to know your opinions on various ways of managing urban deer herds.
Picture below (by Winston McIinnis): bucks resting under a residents' trampoline

8. Would you favor or oppose any efforts to reduce the size of the deer herd in your community?

- ◯ strongly favor
- ◯ favor
- ◯ not sure
- ◯ oppose
- ◯ strongly oppose

9. How are urban deer currently being managed in your community?

- ◯ There is no management program that I am aware of.
- ◯ Capturing/Tranquilizing and relocating the deer
- ◯ Capturing and processing the meat
- ◯ Fertility control
- ◯ Regulated hunting with firearms
- ◯ Regulated archery hunting

Other (please specify)

10. Who makes the decisions about how deer are managed in your community? (Check all the apply)

- ☐ City Mayor
- ☐ County Judge
- ☐ Property Owner Association
- ☐ City Council
- ☐ Residents of the community
- ☐ Texas Parks and Wildlife Department
- ☐ Animal Rights Activists

Other (please specify)

Urban Deer

11. What would you consider to be evidence of a successful urban deer management program? (Check all that apply)

- [ ] Reduced number of deer/vehicle collisions
- [ ] Decreased native habitat loss
- [ ] Improved health of the deer herd
- [ ] Loss of a distinct browse line
- [ ] Survival of more deer per acre
- [ ] Removal of all deer in the community
- [ ] Reduced loss of ornamental landscaping
- [ ] Lowered fertility rates in the deer herd
- [ ] Reduced number of resident complaints
- [ ] It is impossible to successfully manage urban deer herds

Other (please specify)

12. To what extent are you informed about the methods presently used to manage deer in your community?

- ◯ a lot
- ◯ some
- ◯ not at all

13. What would you consider the most effective method of delivering educational materials about urban deer management to the residents of your community? (Check all that apply)

- [ ] Urban Deer Management web page
- [ ] CD/DVD
- [ ] Information Booklet
- [ ] Recurring Television Show
- [ ] Question and Answer Public Meetings
- [ ] Workshops
- [ ] Educational display of information at community meeting hall
- [ ] Community News Letter
- [ ] Acquisition of reference books on deer-related topics by local public libraries
- [ ] Exhibits at public events
- [ ] Speaking engagements at homeowner associations, club or professional organization meetings
- [ ] Brochure

Urban Deer

14. Many issues surface about ways to manage urban deer. How often do you consider the following issues when you think about deer management in your community.

	Never	Almost Never	Sometimes	Almost Always	Always
Cost to taxpayers	◯	◯	◯	◯	◯
Works quickly	◯	◯	◯	◯	◯
Safety around people	◯	◯	◯	◯	◯
Never fatal to deer	◯	◯	◯	◯	◯
Allows deer to coexist with humans	◯	◯	◯	◯	◯
Similar to the way nature would balance the herd	◯	◯	◯	◯	◯
Easy to use	◯	◯	◯	◯	◯
Health of the deer	◯	◯	◯	◯	◯
Deer do not suffer	◯	◯	◯	◯	◯
Method is humane	◯	◯	◯	◯	◯

15. How acceptable are the following methods of managing urban deer herds.

	Very Unacceptable	Unacceptable	No Opinion	Acceptable	Very Acceptable
Do nothing at all.	◯	◯	◯	◯	◯
Allowing closely regulated hunting with firearms.	◯	◯	◯	◯	◯
Allowing closely regulated hunting with bow and arrow.	◯	◯	◯	◯	◯
Doing nothing and allowing nature to take its course.	◯	◯	◯	◯	◯
Using fertility control.	◯	◯	◯	◯	◯
Training and supervising qualified volunteers to shoot deer with firearms.	◯	◯	◯	◯	◯
Building fences to keep deer away from homes, roads, and parks.	◯	◯	◯	◯	◯
Changing the habitat so that deer have no place to live near people.	◯	◯	◯	◯	◯
Capturing deer and processing the meat.	◯	◯	◯	◯	◯
Capturing deer and moving them somewhere else.	◯	◯	◯	◯	◯
Hiring professional sharpshooters	◯	◯	◯	◯	◯

16. To what degree do you believe your opinons about deer management in your community are being considered?

◯ a lot

◯ some

◯ not at all

Urban Deer

17. To what extent would you like your opinions about deer management in your community to be considered?

- ◯ a lot
- ◯ some
- ◯ not at all

18. Which one of the following options to manage an overabundant urban deer herd would be the most expensive?

- ◯ Trap and relocate
- ◯ Trap and process
- ◯ Tranquilize and relocate
- ◯ Fertility Control

19. Suppose that a "Deer Action" committee was being organized to develop a plan to manage the deer herd in your community. Residents with various points of view (called stakeholders) would be expected to attend this meeting. If you attended this meeting, what type of stakeholder(s) would you represent? (Check all that apply)

- ☐ Those who want to save the deer.
- ☐ Those who object to urban wildlife management.
- ☐ Those who dislike the deer for various reasons.
- ☐ The media
- ☐ Disgruntled homeowner
- ☐ Animal rights representative
- ☐ Those who want to reduce the size of the deer herd.
- ☐ Those who object to hunting.
- ☐ A representative of the state game agency
- ☐ A hunter
- ☐ A city official

Other (please specify)

20. How is the Texas Parks and Wildlife Department involved in urban deer management? (Check all that apply)

- ☐ Issue permits for the community to legally manage their urban deer herd
- ☐ Visit communities to help form deer action committees
- ☐ Assess size of deer herds in communities
- ☐ Advise communities on how to deal with their urban deer issues
- ☐ Participate in reducing the size of the urban deer herd
- ☐ Provide funding to implement urban deer management
- ☐ Enforce the game laws associated with urban deer management
- ☐ Texas Parks and Wildlife Department is not involved in manging the deer in urban communities.
- ☐ I am not sure.

Urban Deer

4. Urban Deer: Fact or Fiction

21. Below are some general statements about urban deer. Tell us whether each statement is fact or fiction, or whether you are not sure.

	Fact	Fiction	Not sure
The size of urban habitats prevents deer herds from growing too large.	○	○	○
Urban deer can carry diseases that affect humans.	○	○	○
Urban deer can destroy habitat used by other animals.	○	○	○
In order to survive, urban deer rely heavily on supplemental food sources.	○	○	○
Urban deer can begin to produce fawns when they are six months old.	○	○	○
Twins are a common result from urban deer reproduction.	○	○	○
More deer per acre means the deer will be physically larger in size.	○	○	○
The most common cause of death in urban deer herds is predators.	○	○	○
The least common cause of death in urban deer herds is disease and starvation.	○	○	○
Deer are an endangered species in Texas.	○	○	○
Deer live in urban areas because they have adapted to living near people.	○	○	○
People can help urban deer the most by letting nature take its course.	○	○	○
Deer live in urban areas because human development has pushed them out of their natural habitat.	○	○	○
People have done more harm than good for urban deer.	○	○	○
People can help urban deer the most by managing them.	○	○	○
Fertility control techniques for managing urban deer are cost effective and easy to implement.	○	○	○

Urban Deer

5. Recreational Preferences

22. What are your favorite outdoor activities that involve wildlife? (Check all that apply)

- [ ] Not interested in any outdoor activities involving wildlife.
- [ ] Wildlife observation or watching.
- [ ] Nature walking
- [ ] Hunting
- [ ] Fishing
- [ ] Bird watching
- [ ] Bird feeding
- [ ] Camping
- [ ] Canoeing
- [ ] Boating
- [ ] Hiking or backpacking
- [ ] Wildlife photography

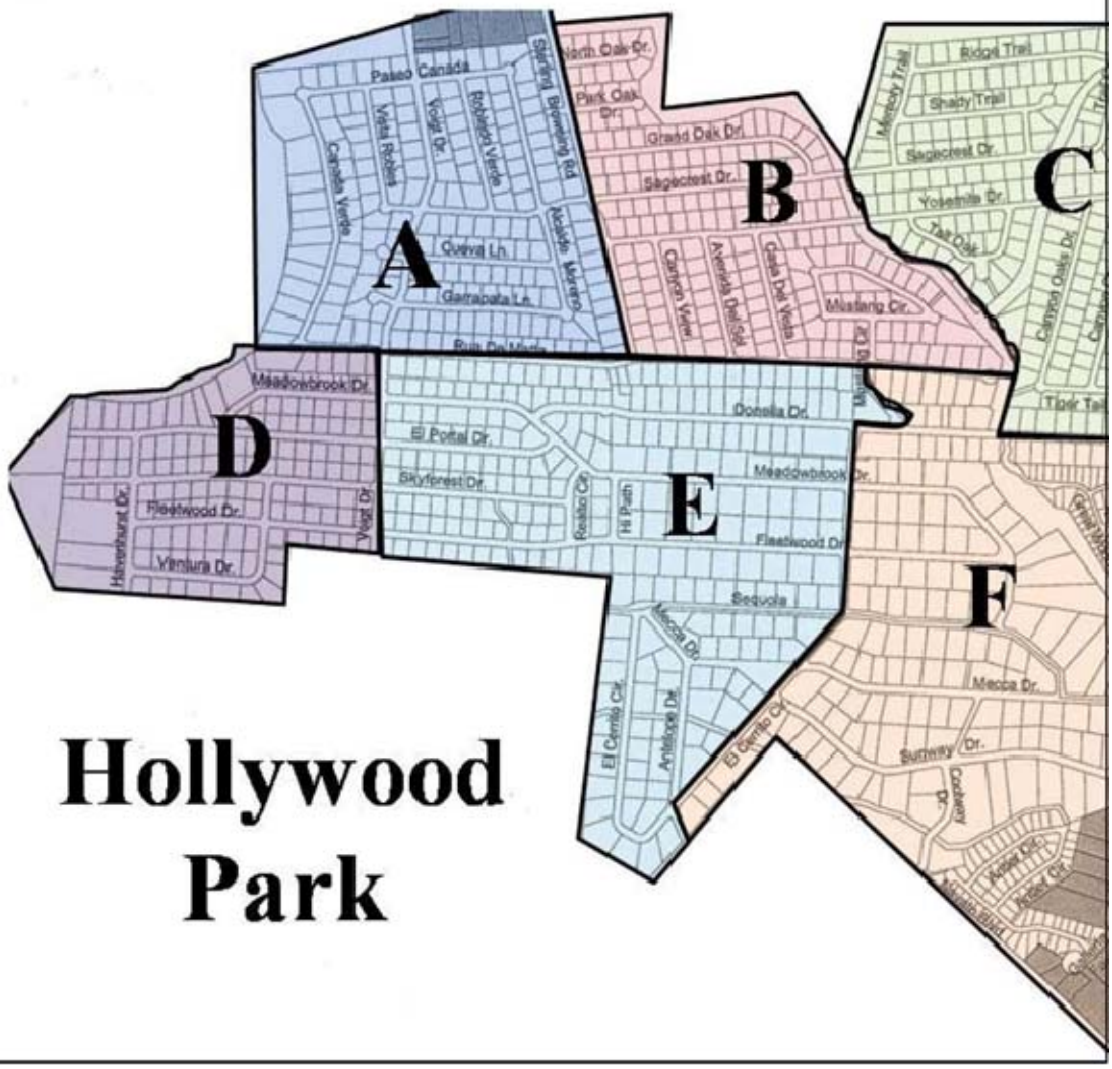
Other (please specify)

Urban Deer

6. Where you live?

23. On the map below, in what part of Hollywood Park is your home located?

- ◯ I live in Lakeway. (Please scroll down to the next question.)
- ◯ A
- ◯ B
- ◯ C
- ◯ D
- ◯ E
- ◯ F



Urban Deer

24. Which subdivision of Lakeway is your home located?

- ◯ I live in Hollywood Park. (Please scroll down to the next question.)
- ◯ Lakeway
- ◯ Arbolago
- ◯ Bella Strada
- ◯ Bluffs
- ◯ CV-Woods
- ◯ Casa Verde
- ◯ Cardinal Hills
- ◯ Cedar Glen
- ◯ Champions
- ◯ Cherry Mountain
- ◯ Coves
- ◯ Courtyard
- ◯ Cross Creek Villas
- ◯ Deerfield
- ◯ Estates Above Hurst Harbor
- ◯ Edgewater
- ◯ Estates of Lakeway Hills
- ◯ Enclave at Alta Vista
- ◯ Estates at Cherry Mountain
- ◯ Fairway Villas
- ◯ Flint Vallery (Flint Rock Falls)
- ◯ Flintrock (Flint Rock Falls)
- ◯ Glen Heather
- ◯ Harbor Hill
- ◯ Hurst Creek Square
- ◯ Lake Chandon
- ◯ Lake Creek Estates
- ◯ Live Oaks
- ◯ Lake Oak Estates
- ◯ Lakeway Townhomes
- ◯ Moores Treetops
- ◯ North Lakeway Village
- ◯ The Oaks
- ◯ Palomba
- ◯ Patio Homes
- ◯ Retama
- ◯ Ridge at Alta Vista
- ◯ Round Mountain Estates
- ◯ Santorini Villas
- ◯ Schooner Cove
- ◯ Schramm Ranch
- ◯ Seawind
- ◯ St Andrews
- ◯ Stoney Creek
- ◯ Sunset Park
- ◯ Terrace at the Preserve
- ◯ Terraces at Flintrock
- ◯ The Preserve at Lakeway
- ◯ Tonkawa Place
- ◯ Travis Oak Trails
- ◯ Villas at Flint Rock (Flint Rock Falls)
- ◯ Waterfront
- ◯ World of Tennis
- ◯ Yaupon Creek

Other (please specify)

25. How many people live in your household?

26. Do you own or rent your home?

- ◯ Own
- ◯ Rent

27. How many years plus months have you lived at your current residence? Example: 2 years and 6 months

Years

Months

Urban Deer

7. A Few Questions About You

Okay, you have practically finished the survey. There are just a few questions left about yourself. This information will allow us to compare your responses with others like you.

28. How many years plus months have you lived in Texas? Example: 2 years and 6 months

Years
Months

29. What year were you born?

Year 19_ _

30. Are you male or female?

- ◯ Male
- ◯ Female

31. How would you describe yourself? (Check all that apply)

- ☐ White
- ☐ Black
- ☐ Asian
- ☐ American Indian
- ☐ Of Spanish/Hispanic origin

Other (please specify)

32. What is the highest level of education you have completed?

- ◯ High school graduate
- ◯ Military, trade school
- ◯ Some college
- ◯ College graduate
- ◯ Master's Degree
- ◯ Ph.D.
- ◯ Professional (law, medicine, veterinarian)

Other (please specify)

33. What is your present occupation?

Urban Deer

34. What was your approximate total household gross income in 2007?

- ◯ Less than $30,000
- ◯ $30,000 - $39,999
- ◯ $40,000 - $49,999
- ◯ $50,000 - $59,999
- ◯ $60,000 - $69,999
- ◯ $70,000 - $79,999
- ◯ $80,000 - $89,999
- ◯ $90,000 - $99,999
- ◯ $100,000 - $109,999
- ◯ $110,000 - $119,999
- ◯ $120,000 - $129,999
- ◯ $130,000 or more

35. Is there anything else you would like to share with us? Please use this space for comments.

Urban Deer

8. End of Survey

Your participation in this survey is greatly appreciated. Consider reviewing your responses before submitting them. This survey will allow us to assess the types of information required by urban residents to more fully understand the best management practices for urban deer herds. Data collected from this survey will then be used to assist communities like Lakeway and Hollywood Park, as well as the Texas Parks and Wildlife Department, in determining the type of educational materials needed to provide relevant, current and accurate information about urban deer ecology and management for the urban resident. Thank you again for your participation.

White-tailed deer in Hollywood Park, TX

Picture Taken By: Christopher Reidy

APPENDIX B

INITIAL POSTCARD

We Want Your Opinion About Urban Deer

Hello,
You are invited to participate in an Internet survey about urban deer management in your community. Please take a few minutes to visit the study website at **www.surveymk.com/urbandeer** before April 7, 2008. Feel free to contact me with any questions regarding this survey. Thank you for your time and participation.

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Code #
Citizen of Hollywood Park
Address
Hollywood Park, TX 78232

Post Office - Barcode area 5/8"

APPENDIX C

THANK YOU / REMINDER POSTCARD

We Are Waiting To Hear From You!

Hello,
A few weeks ago I invited you to participate in an Internet survey about urban deer management in your community. Thank you if you have already responded. If not, please take a few minutes to visit the study website at **www.surveymk.com/urbandeer** before April 21, 2008. Feel free to contact me with any questions regarding this survey. Thank you for your time and participation.

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APPENDIX D

NON-RESPONSE POSTCARDS

Urban Deer Management

We Did Not Hear From You!

Hello!

Several weeks ago I invited you to participate in an Internet survey (**www.surveymk.com/urbandeer**) about urban deer management in your community. As of today, I have not received a response from you. Please take a few moments to answer the question on the bottom portion of this card. After you have answered the question, tear off the bottom portion of this card and place it in the mailbox. Your response is greatly appreciated. Feel free to contact me with any questions regarding this survey. Thank you for your time and participation.

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Citizen of Hollywood Park/Lakeway
Street Address
City TX, Zip Code

Which of the following statements explains why you did not respond to the urban deer management survey? (Check all that apply)

___ I do not have internet access.

___ I am unaware of urban deer management in my community.

___ I have no interest in urban deer management.

___ I do not live in Hollywood Park or Lakeway.

___ I did not want to take the survey.

___ Other:_____

Comments:_____

_____

_____

_____

_____

_____ Code # HERE

APPENDIX E

SURVEY COMMENTS

Hollywood Park

1. **“**I enjoy seeing the deer in our neighborhood, but realize they have to be controlled. I am in favor of birth control, and of managing the deer by removal and relocation.”
2. **“**I moved to this neighborhood because of the deer. I enjoy watching them. I understand and support deer management, but I believe we need to keep some of the deer in Hollywood Park. Deer add to the charm and natural beauty of the park.”
3. **“**The herd in Hollywood Park has been decimated with the trapping, darting, and removal that has occurred. We enjoyed the deer. It is one of the things that attracted us to Hollywood Park. It is a shame what has been allowed to happen to the deer here.”
4. **“**The deer add so much to our neighborhood. We moved into the deer's home and that must be respected. The area where we live is an island of larger land tracts with wild areas, now surrounded by subdivisions of many homes. People from neighboring areas bring their children to see the deer and delight in seeing them as well. We love the deer and after all these years, still excite in seeing them daily. Our concern is that the four we started with on our property, have quickly multiplied into 12, with does and their own grown "children" having twins each year. There just isn't enough food for that many deer in nature here.”

5. **“**We have removed enough deer for now. I built my home in Hollywood Park in 1971 specifically for the lot size and the ambiance of the deer. Over the years, the deer have been over populated but the recent trapping has taken care of that. I do not want to see the deer population eliminated as some extremely vocal people here have advocated including certain councilmen.”
6. **“**Deer management is working. The number of deer observed is 1/10 of what would have been 6 years ago.”
7. **“**I feel they have thinned the herd a little bit too much in Hollywood Park. I want the deer to be healthy, but I hardly see them anymore and I do miss them. I think many have moved to Hill Country Village to our south. I could be wrong, but they seem to have many more than we do. I do not know if they thin their herd. Unfortunately, new people moving into Hollywood Park complain about the deer. There really are many plants the deer won't eat. I love them. That is one reason we live here!”
8. **“**I think our management program has been a success. We see very few in the yards now. Still see them hit on busy HWY 281.”
9. **“**I have heard from a very reliable source that a large number of the deer relocated from Hollywood Park died after being moved. If they are going to die from natural causes in Hollywood Park, why move them just so they can die somewhere else--somewhere they are not familiar with the habitat??”
10. **“**Whatever my answers were (I was interrupted many times) I enjoy the deer and would like to see them taken care of - not collected and then transported to who

knows where. Our city has the ability to hire people who to take care of our "deer situation" who think highly of themselves but demonstrate they have no people skills nor do they have the knowledge to handle the deer with compassion and understanding although they tout themselves as "experts". They only have one thing on their mind - getting rid of as many deer as possible in the shortest period of time because they really do not like the deer. There should be someone handling the problem (if it is a problem at all except for the poor deer) that has an ounce of compassion or feeling for animals and be able to treat them with respect and compassion. Someone who might truly understand how wonderful and what a contribution they are to all our lives."

11. **"**This is a complicated issue with no easy answers. Urban development trapped the deer in our area. With some type of population control I think we can learn to live with the deer and other wildlife in our neighborhood."
12. **"**If fertility control is a true means of management, it is, in my opinion the only practical solution to this "problem." I don't feel it is a problem at all. The deer help to slow traffic, which is safer for children playing. The fact that they do eat plants is one of the items a person must accept if they choose to live here. This is a political football, depending on who may have possession of the office at the time of these surveys. It is a fact that animals will not invade space. If that space is all they have to exist in, they will certainly try to adapt. It would seem to me that we, humans, who are given dominion over all could adapt also. We cannot legislate Mother Nature. We are trying every way possible to prove that we can

manage to live our lives the way we want, all else be damned. The deer, the skunks, the raccoons, the fish, and all other types of breathing mechanisms were here before humans, and they will somehow adjust to all the travesties we as humans inflict upon them and ourselves, and survive us."

13. **"**I love the deer in my neighborhood. It's part of the reason I live here. However, I'm tired of people either trying to make them pets by feeding them and getting them used to humans. Or, they move here thinking it's really nice to have deer, only to find that they can't plant regular urban landscapes without the deer destroying them. So, then they want to totally get rid of them. They need landscaped help, not deer riddance. My opinion: The deer were here first. Live with them or the people should move out! And don't feed them or have them get used to being around humans. Also, I'm not on any of the maps indicated on this survey. I live across US 281 from Hollywood Park in Shady Oaks, an old neighborhood that was here before San Antonio came out this far. In addition, we have a coyote problem far worse than the deer. This neighborhood is completely surrounded by the city now and the coyotes have nowhere to go. Would really appreciate some info and help for our neighborhood. I strongly favor animal management."
14. **"**The people should be able to vote on deer removal not the city manager deciding."
15. **"**Hollywood Park is a poor environment for deer. I suggest that all deer be removed."

16. **“**In the interest environmental balance, re-introduce the cougar and wolf. Lots of deer and retirees to provide the food source.”
17. **“**One of the reasons we moved to Hollywood Park was because we enjoy watching the deer.”
18. **“**One of the main reasons we bought a home in HP was because of the deer. My children have enjoyed watching them, feeding them, seeing the birth and care of fawns. We had some white face and white hoofed deer with blue eyes that were awesome, now they have been trapped and are gone! We would see them daily in our yard and they seemed like part of us. Not anymore. Older people are brought to HP from nearby nursing homes in buses to see the deer, and there not many to see anymore. We miss the deer.”
19. **“**Must manage the deer herds, must relocate and/or eradicate humanely.”
20. **“**When will results be published?”
21. **“**The trapping in Hollywood Park was poorly managed with poor results. The herd was overpopulated but instead of having Texas Parks and Wildlife help assess the herd and appropriate size and distribution of sex they let commercial operations trap. They took the healthy deer and left the poorest of the herd to bread and in my opinion took too many. Of course they took all the mature bucks with well developed racks.”
22. **“**Deer can be protected by careful management.”
23. **“**This is a major problem not just in Hollywood Park but in our neighborhood of Shady Oaks across the freeway from Hollywood Park. The deer appear skinny

and weak, and eat all of most of our flowering plant destroying habitat for other wild animals. Hunters also fire rifles at deer during the year, which creates a major safety issue. We have met with city officials, but deer management in San Antonio is low on their priority list. It will be that way until someone is shot."

24. **"**Both my spouse and I moved into this area because of the deer. We lived in the country but the city moved out there and the commute in became too time consuming. Plan to eventually move out to the country again, but until that time we enjoy the deer in Hollywood Park but not the new influx of people who now want to eradicate them from here. They were here first and now are trying to survive in their natural habitat. You can see where they return to the same places over the years. They did need to reduce the numbers due to poor health and overcrowding but now the numbers seem to really be in control. I don't see many deer as I formerly did when I first moved here. I would see over 40 or so throughout the neighborhood. Now I see maybe 4 during a good week. I know they are around because as I walk through the creek bed I notice droppings but I don't see them there like I use to when I first came here."

25. **"**During the last 6 months the number of deer have drastically dropped in our neighborhood. I have seen zero deer in our yard in last 90 days. During the period of the last 5 years prior to recently, it was not uncommon to have deer in the front yard on a daily basis. Discussions with neighbors in area support the observations that there has been a significant decline. The mayor and council

have been advised of the reduction for their guidance in determining future trapping levels."

26. "Indifference of government, state, and city officials concerning citizen's suggestions for deer management."

27. "Thank you for letting us have input. Support removal of some deer but upset over HP council refusing to release the white faced deer back into the community when they were trapped. Felt they were rather unique, people came from other communities to see them."

28. "In Hollywood Park the state trapper is making money on the side. This means that more deer or being taken than what is allowed. This also means that the wrong type of deer are being taken (large bucks). There were never any homes for sale before the deer management of the city council. "What we do is for the community." says the city council."

29. "I have supported the efforts of the city to reduce the number of deer in H.P., but believe that for now enough deer have been removed. I would not support eliminating the entire population of deer."

30. "I can almost understand some need of control but we have gone way too far in Hollywood Park. It seems that the deer manager answers to no one."

31. "Hollywood Park is recognized all over the world because of our deer. We are very blessed to have the deer and should enjoy them. You can have beautiful yards as there are so many plants you can use and can fence off others. The deer make Hollywood Park a very special recognized place."

32. “Deer and people do not coexist well. We need to remove "all" deer from Hollywood Park. The deer we have are stranded from the development of the area.”

33. “I would like to see deer numbers kept stable by trap and transplant methods. I would like to see deer health improved and (hopefully) pressure on homeowners' landscaping by setting up high protein feeding stations in the neighborhood common areas. The feeding could be funded by residents who want to keep some deer in the area.”

34. “There must be the most effective method where safety of the animal, cost, and efficiency are the three factors to be considered, and in that order. Find the solution then do it!!! The old 80-20 rule. Some people just like to argue.”

35. “I do not live in Hollywood Park, but across US 281 in a small community. Deer normally do not come in, but many are killed within 1 mile west of the entrance. So, I have answered these questions on that basis.”

36. “We have lived in Hollywood Park over 27 years, having moved to this most recent home in 2006. We have watched the deer population explode over the years and we started losing vegetation to the deer in 1992. The term "Deer resistant plants" is misleading, if a herd of deer tries your plants, they are gone whether they liked them or not.”

37. “I would think there would be a way to sterilize the deer that would control the population. I have no idea of the cost or effectiveness. I enjoy watching the deer

in the neighborhood, but there are more and more every year since most of the does are having twins. Soon it is going to be totally out of control."

38. "I miss seeing deer in my area. People are selfish and want no deer--but the deer were here first."

39. "It's true that the deer were here before this area became a residential area. It's true that the deer habitat has gotten smaller, and the deer population has gotten too large to adequately support its size. The habitat is hazardous to the deer, (daily road kills, injured animals, etc) and it should be obvious to the casual observer that the deer are scrawny, and small in size. I'm okay with the deer being here, and as I said, they were here first. The humans are not leaving, so I think we owe it to the deer to manage them to where they can co-exist has well as possible. To me, that means controlling the number of the deer. Urban deer are still going to be road kill, and that's a given, but it distresses me more to see the scrawny, sickly looking deer that I see daily here in the park."

40. "Yes, I am concerned that too many deer have been taken out of Hollywood Park, TX. We can do a much better job if we all work together to help our four legged friends."

41. "I am quite impressed with your survey and attention to this important matter."

42. "If people don't like the deer, then they need to move or put up deer fences. We also have raccoons, skunks, coyotes, etc. which animal does the most harm? We like the wildlife; that is what is so special about the neighborhood."

43. “I have no problem having deer in my yard. They have been here since before I arrived, just not in such large numbers. I realize that any solution is going to have problems. Regular trapping and relocating seem to be the best activity; however, obviously, they are not a solution but an ongoing process.

44. “I think the deer herd needs to be controlled and reduced in a humane way.”

45. “When can we get professional & educated personnel to manage deer in Hollywood Park, rather than politically and monetary motivated individuals? The spouse of the "tax paid" deer committee chair has poaching arrest history! I am a current member of a "Deer Committee" and am never included on activities unless it's administrative, reviewing copied & pasted information being submitted to city officials. I have attended Disease in Nature Conferences, Urban Deer Seminars and have learned (and have experience) with the procedures of brain stem removal, all by obtaining event information and professionally knowing trainers/presenters without benefit of Hollywood Park "Deer Officials." Myself, as well as another deer committee member feel as though we are intentionally left out, as we are not "cloned corn feeders of the street" in effort to trap & dart. I have 3 badges that represent 29 years of enforcing state & federal laws of human handling of live animals and what I have seen along a main street of HP and on tape disgusts me. However, I remain patient in the hopes that one day HP will have a good, common sense, professional that is experienced in wildlife management to maintain the balance that is necessary.”

46. “Please remove deer from Hollywood Park; ok just leave 2 of them.”

47. “I have previously contacted Cornell University, about their 'sterilization' program with one of Ithaca, N.Y's sub-divisions (Cayuga Heights), who have had similar deer population control issues. I have E-mail, Web-site information if you wish to contact them.”

48. “As I have said in comments above, the main issue for me is this: in my opinion the council here does what they and a few want. They don't have a good methodology for reaching out to the entire community to solicit opinion. They don't communicate well; they communicate for their own convenience. They tend to bring in opinions that support their own. They tend to make silly laws affecting few people (i.e. don't part on street between 2 and 5 a.m.). Whatever deer management has been done, residents at large do not get information unless they go and seek it...or when it heats up every few years. I have had my opinion actually solicited on only one issue in almost 9 years. I have gone and given it, as well. Communicate, communicate, communicate, is my message regarding whatever deer management plan makes the most sense. Not all of us "have been here 50 years" or are retired or have a lot of time to study this particular issue. Push the information out...and push it all out...not just what a few residents or a few council members want to be heard.”

49. “Fences make good neighbors, wooden fences keep deer out of back yards, plant deer resistant plants, put water out for deer, limit feeding, drive slow for the protection of people and deer, report any injuries to the deer, check health of the

deer population, limit deer population with humane ways, educate public on shelters, food water. Deer make good neighbors too."

50. "Our family moved to Hollywood Park because of the ambiance, which included the deer. The level of information--and apparently the level of truthfulness--provided by the city's leaders is minimal and often not worth listening to. If there really is a need to control the deer--for the good of the deer--a humane method such as fertility control is the only one I would endorse. If individuals do not like deer, they clearly have made a mistake in moving to Hollywood Park."

51. "I am opposed to the extreme measures on either end. I do not agree with the trap and transport option as this does not benefit the deer, just the landowner who profits from their hunters. My husband is an avid deer hunter but loves having the deer around our house and would never consider harming one of these animals. One of the main features that we liked about Hollywood Park is its deer population. I also find it amusing how residents of Hollywood Park are so focused on reducing its deer population (the "predators") when there is free access between Hollywood Park and neighboring Hill Country Village. It seems that those who are opposed to the deer are the ones that have recently moved to The Park. In my opinion, they are welcome to leave - and leave the deer behind."

52. "Deer droppings are a big problem on my sidewalk, porch and driveway."

53. “There is a horrible problem with urban deer in Shady Oaks. There are 500 plus deer in 150 acres. They are reproducing with triplets. There is deer poop, ticks, fleas and nasty male deer stench everywhere. HELP!!”

54. “I like deer in their habitat. It is unfortunate that urban sprawl has forced them to live with us, but I think it is dangerous to have them roaming the streets and yards. Possibility of accidents or injuries to small children during rut outweighs any benefits for having deer in the neighborhood.”

55. “We moved to Hollywood Park for the sole reason of the deer. We want to see more of them.”

56. “I like the deer and the animals in my neighborhood. Let God control the deer!”

57. “The urbanization in this area over the last 20 years has locked in the deer population resulting in a severe deer density problem. Personally, I would like to see zero deer in this area. Being a land owner in Fayette County where the deer population is less than I would like to see it, I think deer belong in the "wild" and not in my front yard where houses are located on 1/2 acre or less. In 1966 when we moved into this locality, if you spotted a deer it was an occasion. Now, it is an occasion if you don't spot a deer.”

58. “Fertility management probably won't any better with deer than it does with people. I like the critters.”

59. “Our city council does not care what the majority of the residents want. They make decisions based on what they or their "cronies" want. It is very frustrating because the minority of the residents get what they want. The council wants all

the deer gone. Hollywood Park has changed very much from when we moved in. It is losing it charm, uniqueness and appeal and becoming just an old tired neighborhood. Many people come to see the deer and go away disappointed. Being fined for feeding the deer and being told what to do on your own property is not right. Now the council is using the dart system and deer are being captured on property where homeowners have not given permission. Children have found "darts" in their yards and given them to their parents. We have some homes with beautiful landscaping and the deer have not bothered them at all. It is possible to live peacefully with the deer, if you want to. They have never bothered our landscaping!"

60. "The residents I have spoken to that are not deer haters feel there is little that can be done because of our city mayor and council. There needs to be a balance but it seems as though the people who support the humane treatment of the deer and want to kept informed prior to actions of the deer haters are being ignored."

61. "I like the deer, always have, always will. I think we should leave them alone - then we should be allowed to feed them."

62. "Don't get rid of the deer, just control the population."

63. "The deer in Hollywood Park have been drastically reduced. There were part of the charm of this area of town. I would like to feed them but I do not want to get fined."

64. "Have town barbeques or donate meat to poor shelter. I disagree with moving them to other location, they are not wild deer. So don't treat them as such. Last

capture and hunt the same injured ones are roaming when they capture healthy ones."

65. **"**We moved into Hollywood Park partially due to the deer in the city, we like being close to nature."
66. **"**Relocate the deer; they would be happier out in the woods."
67. **"**The deer need to be actively managed, if relocation to game ranches is the course of action, fine, but the game ranches should eat or at least subsidize the relocation cost, entire cost should not be borne by the taxpayers. If trapped and processed, the meat should go to local charities."

Lakeway

1. **"**Before anyone starts attempting to lower the deer population, the effect on property values should be studied. Look at demographics of property purchasers in the past five years. In Lakeway purchasers are not farmers and they are not Texans. We like the deer and the deer were here first."
2. **"**One of the things I like most about living in Lakeway is the deer. I love to see them!"
3. **"**I look forward to hearing about the results of the survey."
4. **"**People have to learn to co-exist with wildlife."
5. **"**Generally we don't know what is going on in regard to controlling the deer population. Lakeway residents appear to be strongly divided in their opinions about the deer. Fining residents for feeding any animals on their property seems unconstitutional or ridiculous to me. I certainly wouldn't tell on a neighbor who was

"Big Brother" has too much control in this area. At times Lakeway seems as if it is its own country."

6. **"**I love the deer, I love animals, but they can be destructive. I do have to spend money on deer repellants because they will eat anything when they get hungry enough. I do believe in deer management, but strongly oppose anyone coming into the residential areas with guns or bow and arrows! It was upsetting to see the large net trap they set up a couple of years ago right next to my house on Yaupon Golf Course, but the deer were just so overpopulated at the time. From what I heard they caught over 150 deer, and you could tell. I do not know what they did with the deer."
7. **"**I moved to Lakeway because of the deer. I love them I enjoy looking out my window at night and in the morning to see them. I would be heartbroken if they were gone. I feel if people don't like them they should move."
8. **"**Wildlife conservation was one of the factors that attracted us to Lakeway. Don't blow-it!!"
9. **"**We moved to Lakeway in part because of the deer, we love and enjoy them. We are sensitive to the issue of vehicular accidents."
10. **"**Many residents of this area choose to live here because of the deer, other wildlife, green spaces and lifestyle closer to nature. Removal of wildlife decreases the value of the area. The wildlife help make this the peaceful and desirable area that it is."
11. **"**Deer were here before we were, we should make due."

12. **“**I have lived in Lakeway for about 18 years in two locations, but I have been coming to Lakeway since it was in the development stage in the mid 60's. One reason I moved here was the tradition of having deer and other wildlife to enjoy and cohabit with. I would be for a reasonable, humane management program that maintained a higher population of deer than currently exists.”
13. **“**When I moved here in 2001, the deer herds numbered in the 30s and 40s. Now, they move in herds of 5-8 in the spring including fawns. The current ratio should be maintained. I vote for fertility methods or bow hunting. The roundup and relocation is a really bad idea.”
14. **“**Some of your questions are subject to too much interpretation (e. g., #14; what are you asking for?)”
15. **“**I think urban deer in Lakeway are a symbol of Lakeway and I totally enjoy seeing them running around in the neighborhood. People can deal with the deer by driving slowly, and planting deer resistant plants. Leave the deer alone. I like them!”
16. **“**My family enjoys the deer in our neighborhood. It adds to our quality of life. Any plant we do not want eaten, we put behind a fence. I strongly oppose any measures that would traumatize or injure the deer. In my opinion I find the presence of an ugly trampoline in a yard far more objectionable than the deer. I am referring to the photo of the deer under the trampoline.”
17. **“**We are seeing fewer deer because the lots around our home have been built upon, but they still find us. I know the deer are getting pushed into smaller areas to survive in - always a challenge. Hope you can help solve our dilemma.”

18. **“**Difficult issue, glad to see this survey which means there is an effort to do what’s best overall. While we need to do what’s best for all involved, we must also hold nature and wildlife in high regard as economics and capitalism naturally side with humans and our desires. A balance means things won't be perfect and everyone will not always be happy. Strong leadership on both sides of issue is important so neither side 'wins'. Education, news articles in local paper along with guides on planting strategies, ideas, etc help people feel they have options. Overall, the deer in Lakeway are auto friendly compared to anywhere else I've been as they typically don’t just freak out when you pass. We are lucky in a sense! Overall I think Lakeway has done a respectable job balancing the issue thus far even though the traps are unsettling to see when they go up.”
19. **“**The deer population should decrease proportionately as the acreage in Lakeway is developed.”
20. **“**I believe the presence of many deer actually adds value to the community.”
21. **“**We like the deer as our house is landscaped with deer proof plants - they eat the weeds, etc. With proper landscape planning they can be beneficial in controlled quantities. We have had times where there were 20 or so deer in our backyard back in 2000 - that was too many. There were also a lot of auto collisions at that time. I believe the people who hit deer are the same ones who drive too fast, roll through stop signs, and generally don't drive carefully in our community.”
22. **“**More construction recently is squeezing the deer habitat here more every month. Feeding is currently prohibited.”

23. “Urban deer control requires the cooperation of a significant majority of residents--a city ordinance must be in place prohibiting residents from feeding deer on their property”

24. “Good Luck, a large % of the public has no idea about the reasons to manage the heard or the related costs. They don't realize that Nature is crueler than management by hunting.”

25. “I love having the deer in our neighborhood and miss seeing them as much. When we first came here there were many more than now. I hope if it is needed that we relocate them rather than kill them. The birth control option seems the best in my opinion.”

26. “The greatest thing affecting the deer population is HWY 620.there are numerous fatalities where the deer cross.”

27. “Deer are very much part of the appeal of Lakeway. There are too many who think of them as one would a rodent. If I am misinformed about deer health, I welcome additional UNBIASED information (which is not what I expect from Lakeway authorities).”

28. “I bought my home in Lakeway for the hills, the scenery, Lake Travis and THE DEER! I LOVE having deer in my community. They add to the Hill Country experience! I would be MORTIFIED to hear that they were being killed or trapped! If living with deer means having to drive 30mph through the neighborhood, I'll happily drive 30mph! I would love to get more involved, I just don't know who to contact.”

29. “Urban deer did not "lose" their habitat...humans moved into it. People who do not appreciate nature and balance should move back to the city or put up a fence and quit whining. FYI...the wording of your questions gives away your bias.”

30. “I don't understand why we are not allowed to feed the deer.”

31. “The trapping must stop! The deer are terrorized and I've read the lit from Chicago about the sterilization methods - will save the City money - so trapping is stupid.”

32. “Will the results of this survey be published?”

33. “Please don't do anything to harm the deer. They aren't harming us.”

34. “The deer do what deer do. Stop planting a cafeteria. Native plants have flowers.”

35. “1. I hit a deer at night going 30mph, it ran away so don't know how injured it was. It did not damage the car. 2. Our second home on Lake LBJ also has a deer problem; feeding deer is prohibited, but to my knowledge, this has not changed anything. Our only hope of keeping the deer out of the yard is by installing a high fence or planting dense foliage all around the property. Trying to plant "deer resistant" plants is futile- if hungry enough, they eat everything, even oleander. 3. Thank you for this opportunity to express my views/opinions since my vote was over-ruled to allow sharpshooters in the neighborhood.”

36. “I don't think anyone wants to EXTERMINATE the deer - a few are nice to have around. On the other hand, HERDS of deer wearing a trail through one's back yard are just too much. The population should be managed; CAREFUL hunting, with the meat either used locally or donated to a shelter, would be a win-win situation for everyone.”

VITA

Jessica Lynn Alderson received her Bachelor of Science degree in wildlife and fisheries sciences from Texas A&M University in 2004. She returned to the Wildlife and Fisheries Science Department at Texas A&M University in May 2006 and received her Master of Science degree in August 2008. Her research interests include human dimensions of urban wildlife management. She recently accepted an Urban Wildlife Biologist position with the Texas Parks and Wildlife Department in the Dallas/Ft. Worth area. Jessica may be reached at the Cedar Hill State Park, 1570 FM 1382, Cedar Hill, TX 75104. (Email: Jessica.Alderson@tpwd.state.tx.us)